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4 1916

South America's Truck Field

The Commercial Vehicle

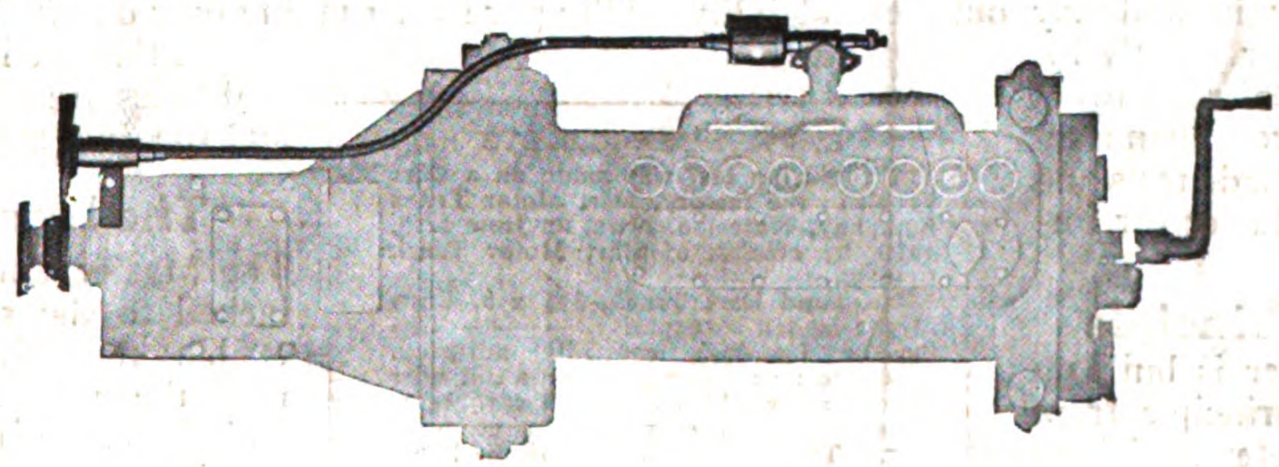
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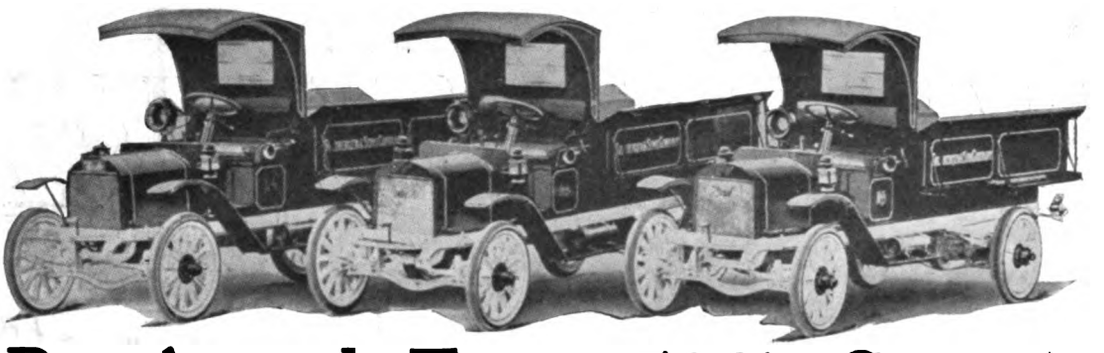
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By Actual Test—50% Greater Mileage with Master Carbureter

Remarkable Test Made June 17th—Results in Master Carbureter Being Specified as Standard Equipment for Dart Trucks

The Master Carbureter is fast becoming standard equipment for the leading truck manufacturers of the country—solely on the strength of its remarkable economy, greater day in and day out dependability and its ability to deliver greatly increased power by actual road test.

Already twenty-three manufacturers of trucks have made tests and have substituted the Master for former equipment.

Entirely New Principle

The Master Carbureter is built on an entirely different principle from old-fashioned carbureters. There is a scientific and logical reason for the Master Carbureter increasing gasoline mileage 50% and more, besides giving greater power, dependability—and speed for those who want it.

The Master is a many-jet Carbureter. Instead of from one to three jets, the Master has as many as 21 jets. Through these jets, the Master feeds less gas than the old type Carbureter does through a single jet. But because the gasoline comes through in smaller sprays, it breaks up and mixes with the air very much more thoroughly. Thus the vaporization is instantaneous and complete—an impossibility with the old types.

DART TRUCK RESULTS

The following test was made on a Dart Truck at the factory, Dart Motor Truck Company, Waterloo, Iowa, on June 17th, 1916, by officials of Dart Motor Truck Company:

1500 pound Dart Truck, 3½ x 5, Buda Motor loaded to capacity, ——— carbureter installed, carefully adjusted. Power test was then made on a hill near factory after which tank and carbureter were drained preparatory to economy test. The mileage result showed 8.4 miles per gallon. Master Carbureter then installed. Power performance showed equal with mileage of 12.6 miles per gallon.

One-ton Dart Truck, 3¾ x 5½, Buda Motor, loaded to capacity with ——— Carbureter installed showed average power with mileage of 10.4 miles per gallon. Master Carbureter then installed. Very perceptible increase in power shown with mileage of 15.2 miles per gallon.

1500 pound truck, power equal. Increase in mileage 4.2 per gallon, or 50 per cent increase.

1-ton truck. Very perceptible increase in power. Increase in mileage 4.8 miles per gallon, or 46.15 per cent increase.

Send for equally interesting figures showing tests made by other Truck Manufacturers now using Master Carbureters.

One Jet at a Time

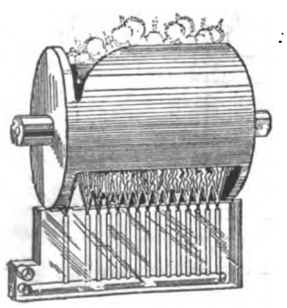
The fuel and air are proportioned mechanically by a rotary throttle. When the throttle is closed for idling or slow running only one fuel hole is uncovered. As the throttle is opened, additional fuel holes are uncovered one by one and the fuel supply increased.

The Master Control

The Master Control is a device attached to the steering post which enables the driver to rarify or enrich the mixture while running. This insures a perfect mixture for varying climates or topographical conditions—a great convenience. Without priming, the Master Control makes starting easy in the coldest weather and enables you to get maximum efficiency out of varying grades of fuel.

Trouble-Proof

The Master Carbureter frees the user from the greatest of carbureter troubles—it does away with all adjustments under the hood. Think what this means to motor truck users. Nothing to get out of order—nothing to tamper with. The Master is both fool and trouble-proof. This feature alone puts it in a class by itself.

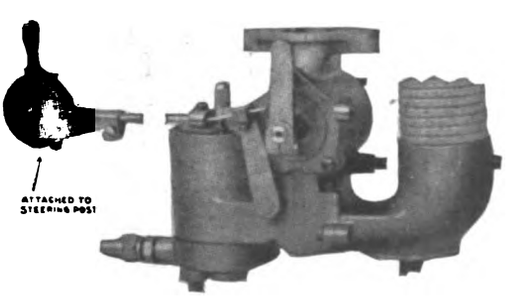


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Book on Carburetion Sent Free

Our Mr. R. M. Anderson, who is recognized as the greatest Carbureter authority in this country, has written a remarkable little book on Carburetion which we will gladly send free to those interested, as soon as it comes from the press. In it he not only explains the principle of carburetion, but shows why the Master is able to produce such revolutionary results. Merely write a letter or postal and we will reserve a copy of this little book for you and send it the moment it comes from the press. We suggest that you send today, however, as the edition is limited and the demand is bound to be large. Please address Dept. 27.

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Detroit, Michigan
Pacific Coast Branch—922-24 So. Los Angeles St., Los Angeles, Cal.

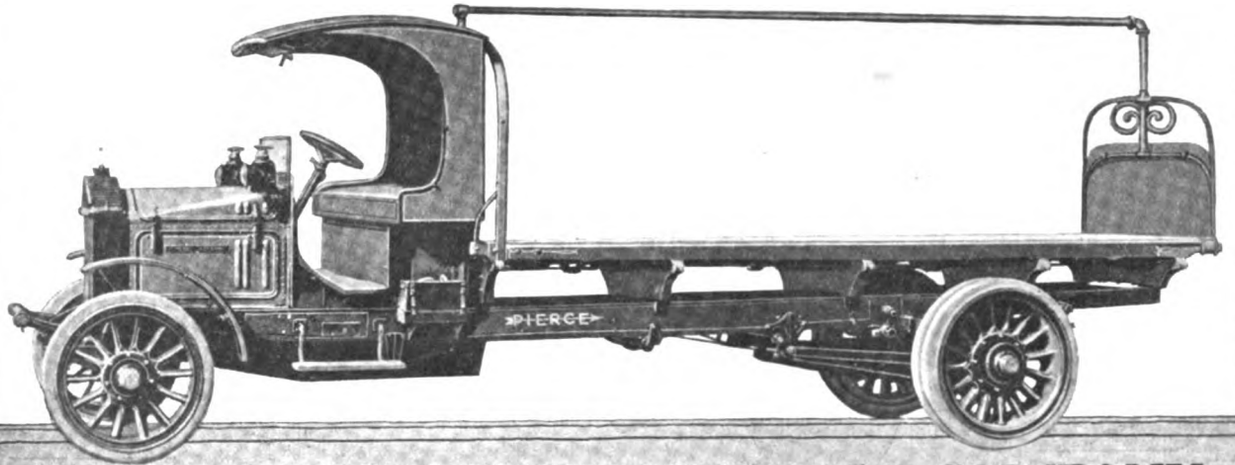


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HESS-BRIGHT
BALL BEARINGS

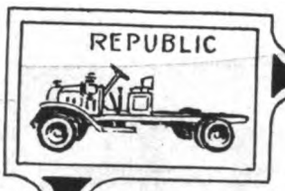


Hess-Bright Ball Bearings are one of the hallmarks of a high-grade motor truck. Their first cost is high—so is the initial cost of a good truck. The motor truck here shown is one of America's best—its manufacturers prefer Hess-Brights.



HESS-BRIGHT MANUFACTURING COMPANY
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HESS-BRIGHT'S CONRAD PATENTS ARE THOROUGHLY ADJUDICATED

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Fuller Transmissions have been adopted as standard by many truck manufacturers whose products are noted because of their ability to transport loads at the minimum of operating and upkeep cost.

The accurate machining of high grade steel and the design of the transmitting members are factors of the Fuller Transmission which have won the endorsement of motor truck engineers.

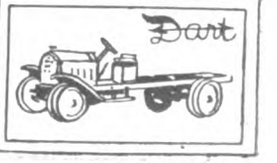
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The COMMERCIAL VEHICLE
Read by Business Men

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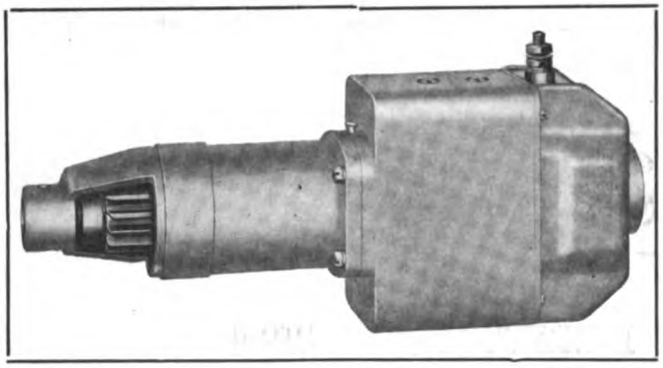
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COMMERCIAL DELIVERY VEHICLE

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The Autocar carries a 2-ton load on a 97-inch wheel-base.

SHORT wheel-base with large body capacity — easy handling in close quarters — the Autocar is unique among motor trucks. It operates quickly in places too small for any other vehicle — team or truck — of like capacity.

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Autocars Have Standardized Delivery Service

Used by More Than 3,000 Business Concerns

Fecher & McGavock, Grocers, of Chicago, say:

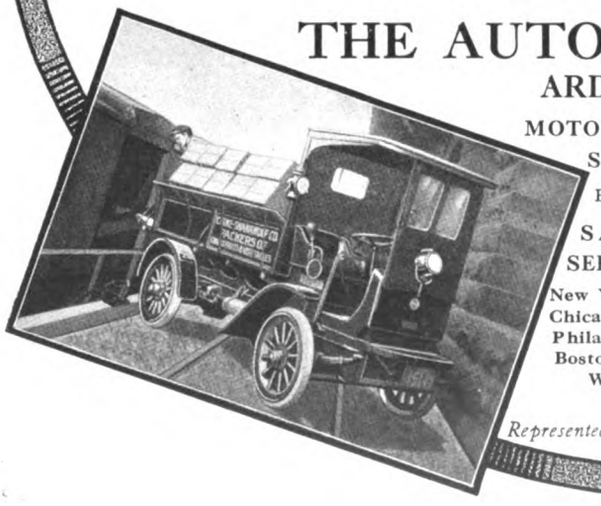
"Two main points of advantage strike us about our Autocar. South Water Street, the produce market of Chicago, is jammed with vehicles from 5 a. m. to 4 p. m. Our car is so short it turns around or pulls out easily. It is the only vehicle we have seen that is conveniently handled in South Water Street.

The other advantage is the small expense. We don't know of any other truck able to haul the heavy loads the Autocar does for us day after day from the market, and with operating cost low enough to be used also for light deliveries."

George S. Raynes Co., Piano Movers, of Philadelphia, say:

"We bought our first Autocar seven years ago and now have four. After years of use of several makes of trucks, we unhesitatingly say the Autocar is the most reliable for its capacity on the market. Our business takes us often to narrow streets at the rears of stores. No other car does this work so handily as the Autocar. Its short wheel-base gives it a big advantage. We use our Autocars also on long trips winter and summer and have been impressed by the remarkable way they stand up under severest conditions."

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The COMMERCIAL VEHICLE
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Vol. XV August 1, 1916 No. 1

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ASTOR, LENOX AND
TILDEN FOUNDATIONS
1917



The Argentine farm cart used so generally in the country to transport wheat, corn and other products to the railroad depots. The cart illustrated has wheels 12 feet in diameter and is capable of carrying from 8 to 12 tons. The two oxen could not handle it loaded. In bad weather as many as twenty-five to thirty-five horses are used

Opportunity Beckons the American Motor Truck in South America's Large Expanses

Good Streets in Cities and Damage Done to Roads by Huge Carts Portend Commercial Vehicle Progress

BUENOS AIRES, June 30.—After investigating motor truck and delivery vehicle conditions in the majority of the larger cities in Argentina, Brazil, Uruguay and Chile, and looking over the possible field for the use of motor trucks in the farming, mining, lumbering, coffee and other industries, one can reach only one conclusion with regard to the future of trucks in this part of South America, namely, that the truck is bound to become more universally used. This progress will occur at a slower or faster rate, dependent on many factors which are bound to arise.

From this opening paragraph do not conclude that the motor truck has not arrived in Argentina, Brazil, Uruguay and Chile. It has, and has been there for years, but not in those quantities that its usefulness would warrant. A few examples may serve to give some conception of the present use of trucks.

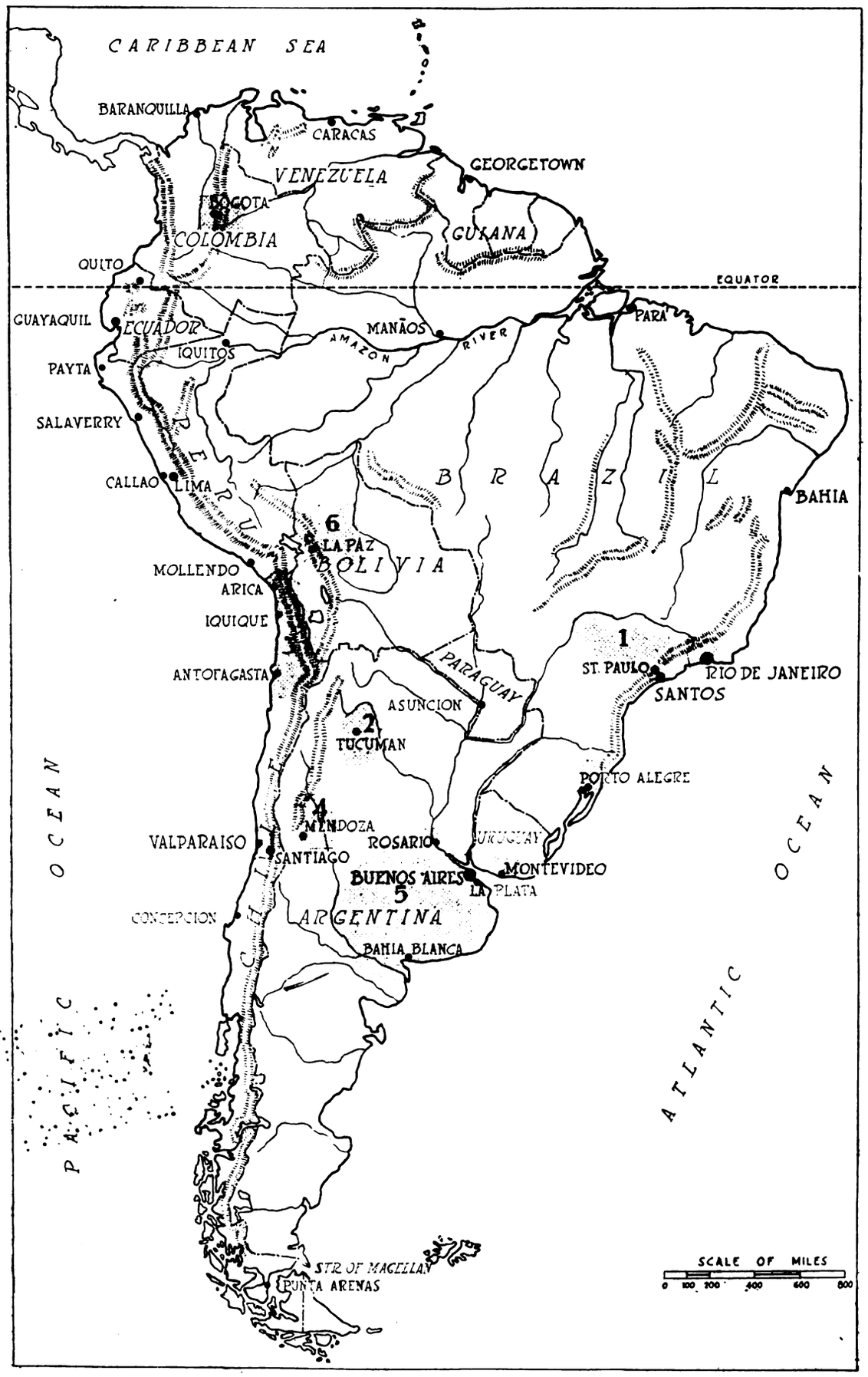
South America

This is the first of a series of articles on the use of motor trucks in South America by David Beecroft, Directing Editor of THE COMMERCIAL VEHICLE, *who recently spent many weeks in Argentina, Uruguay and Brazil, studying the possible fields for the motor truck, motor car and farm tractor in those countries. Mr. Beecroft went as a United States Government delegate, being one of the Return Visit Committee appointed for the express purpose of furthering closer trade relationships between the United States and the different South American countries.*

Many Trucks in Rio

First: Rio de Janerio, the capital of the United States of Brazil and a city of over 500,000, is filled to overflowing with trucks. Europe stocked this city many years ago. Benz and Saurer and Fiat are the leaders, with many English and French makers also well represented. For the last 3 or 4 years few trucks have been sold in Rio, as it is abbreviated, and to-day

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Map of South America reproduced here to give a very general idea of the sections in which motor trucks are operating today and where greater development can be expected. The shaded portions show these sections. Some of them are well stocked with trucks and others have just one or two. South America is a continent nearly as large as North America. The country of Brazil alone is as large as the United States, not counting Alaska. The Argentine republic is as large as the United States east of the Mississippi river. The various other countries, Uruguay, Paraguay, Chile, Peru, Bolivia, Ecuador, Colombia, Venezuela and British, Dutch and French Guiana are all shown

Referring to the shaded areas:

1—Embraces Rio de Janeiro, Santos and Sao Paulo as well as the greater portion of the great coffee country, all ideal for motor truck use

2—Tucuman is the heart of the great sugar cane region of the Argentine

3—Shows the celebrated nitrate fields in northern Chile where a few motor trucks are at present in use and where there is bound to be many more used. The supply of nitrate from these fields is the greatest in the world

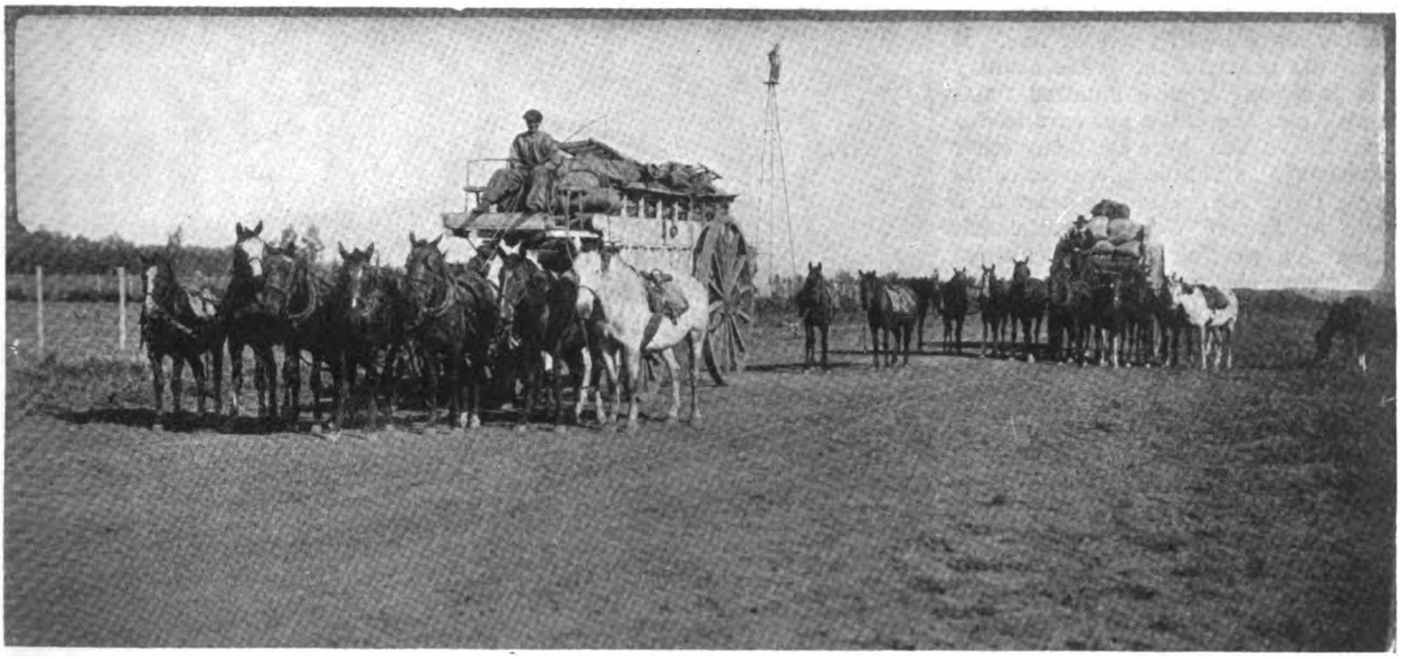
4—Mendoza in the Argentine is the center of the great grape and wine industry. The country is irrigated and has roads well suited for truck use

5—Buenos Aires and the great farming territory around it form the largest field for motor trucks in the Argentine. The city is well suited for trucks and the large farmers will have to use many in the near future

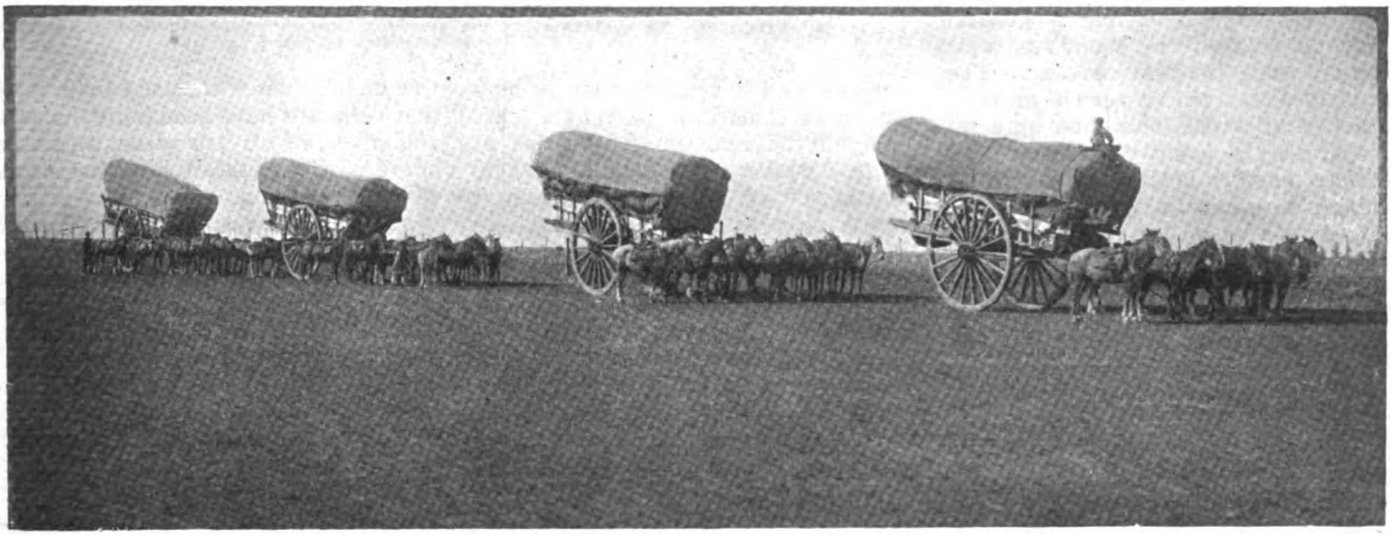
6—The City of La Paz is located in a huge saucer 1250 ft. deep. To make its location still more unique, this saucer is located in a level plateau over 12,000 ft. above sea level. The place is not especially well suited for motor trucks. There is much mining carried on and the ore has to be transported on the backs of Llamas, a beast of burden peculiar to that country and not like other beasts of burden that we are familiar with

There are many other sections of South America in which motor trucks are at present in use and which are not shown on this map. Montevideo, the capital of Uruguay, has a municipal bus line and there are many trucks in the city. There are motor bus lines in sections of Argentina where there are no railroads.

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Typical scene on an Argentine road when grain is being hauled to the railroad depot. In the dry season relatively few horses are needed, but when the ground is wet more than double the usual number is required on each cart. Roads of exceptional width are needed for such carts, which have 60-inch treads. These carts are great destroyers of roads, and the feeling is rapidly gaining that they will have to be replaced. In the Russian settlements four-wheeled wagons with 36-inch wheels are used in place of the carts. Note the extreme width of the road shown



Travel on the railroad train through any part of the grain-growing section of the Argentine and you will see sights similar to this, the huge carts being the only objects of any height that rise against the sky line bounding the level agricultural plains. The carts are about the largest things seen on the plains, often when loaded being higher than some of the adobe huts in which the small colonist farmers and their families live. There is general opposition to these carts because of their destruction of the roads. The loads carried are too great for two wheels and the width of road required by the large number of horses is too great. Note how the horses are harnessed

one truck maker has in stock forty European trucks of one make which he has been carrying in stock for several years, not having been able to move them because of the financial conditions. This dealer had marketed over 200 heavy-duty trucks previous to the crisis.

Further: In Rio to-day the price of gasoline is so high that many trucks are not being used, and a public bus company that was operating a number of buses over the city streets discontinued its service in January, the only reason given being that the greatly increased price of gasoline made it impossible to continue. The buses are at present in storage. It is believed the service will be resumed as soon as fuel prices reach normal levels once more.

Again: Rio has a great many light delivery vehicles such as are used in American cities, and during the past few years several passenger cars have been converted into delivery vehicles, the owners perhaps considering it more profitable to make some use of the vehicles in that way rather than keeping them in storage. Economy has been the rule of Brazil for several years, and this is but one example of how principles of economy are being put into actual operation.

Lastly: Rio is not Brazil. Brazil, or rather the United States of Brazil, for they are as proud of that title in Brazil as we are of the United States of America, is a country of approximately the same size as all of the U. S. A., the same size as Canada, as Australia, and as Europe. Brazil is a huge country, and if you have been picturing it in your mind as being about as large as the U. S. A. west of the Rocky mountains, you must at once revise your conception of it.

Brazil a Huge Country

Brazil has a score of other important cities. Sao Paulo, known as the Chicago of Brazil, is a city of over

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500,000, and will certainly reach the million mark in 10 years or less. It is in the heart of the coffee country and is buying over a hundred times more American passenger cars to-day than Rio. Then there are many other cities, such as Santos, the great coffee port; Porto Alegre in the heart of a very productive German settlement noted for grazing and agriculture; and there are many ports such as Bahia, Pernambuco, San Luis, Para, Manaos, and others that you will see marked on the map on page 6. Only the more important ones are shown.

Brazil Not Much Developed

There are many motor trucks in Santos, there are many in Sao Paulo and they are being used in the coffee industry in the country around Sao Paulo. The same is true in a much more limited sense in other cities of Brazil. Brazil is a wonderful country, divided into more than twenty different states just as the United States is divided into forty-eight states. True, Brazil is not coupled up with railroads, telephone and telegraph lines, but the natural resources are there and the feeling is general that development is bound to come rapidly once the war is over. The country is exceedingly rich in minerals of all kinds, and these mineral resources are being developed. The rubber industry is well known. Cattle raising is a big industry. Brazil is already second to Argentina in frozen meat exports. Besides you can add scores of industries such as coffee, rice, sugar, textiles, etc. Complete details on specific industries will follow logically in later articles.

Argentina, the Garden of the South

Turn now for a brief conception of the Argentine Republic, looked upon as the most modern country in South America and a country that is buying more American passenger cars than all the remaining countries of South America put together. Argentina is not as large as Brazil, but it is a country of no mean stature. In terms of the United States it is equal in area to all of our country east of the Mississippi river. This area becomes more magnetic when you remember that the majority of the land is useful agricultural soil such as found in the Mississippi valley, which comprises our most fertile states such as Illinois, Iowa and Minnesota. The Argentine soil is exceptionally productive and in places the land is so level that railroads have been built for over 100 miles in a stretch without a single curve or the slightest deviation from the straight line.

This great area, equal to that of twenty-five states in our country filling the space between the Mississippi and the Atlantic, stretches from north to south a distance of approximately 2800 miles, or greater than the distance from New York to San Francisco. It enjoys a very wide range of temperature, from tropical to almost antarctic.

Argentina has a world-wide repu-



Buenos Aires—This shows one of the many wide business streets being built in the city. Years ago the city had nothing but very narrow streets, as shown in the contrast picture on the opposite page. These new modern streets are well paved with stone blocks as well shaped as brick and affording a smooth surface. In portions of the city every fourth street is being made as wide as the one shown above. These new streets radiate in all directions. This widening of the streets makes Buenos Aires an ideal place for the use of motor trucks



A view on the new stone road between Buenos Aires and La Plata, a distance of 65 miles. This stone-block road is just completed and there is no finer road in Europe or America. It is built with the solidarity and detail of a railroad right-of-way. The expense was very high. La Plata is a great seaport and the Swift and Armour packing plants are located there. There is bound to be a big motor truck traffic over this road. The two-horse carts shown are bringing garden products into the Buenos Aires markets



A wide main street in the outskirts of Buenos Aires, showing the great width of a well-paved street. This street leads past one or two railroad depots and several docking areas. It is typical of streets on which motor trucks will have to operate. The illustration shows one of the tens of thousands of carts seen in the city. Many are drawn by one horse and others by two, three, four and six animals. Generally a double trolley line occupies the center of these new wide streets, and between the lines are posts to carry the electric lights and support the trolley wires

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Buenos Aires—This photograph must be viewed in contrast with the one at the top of the preceding page. They are companion illustrations. This shows a street in the older section of the city, where the streets intersect at right angles. The streets are narrow, only wide enough for two lines of vehicles. On many of the streets there is one street car line placed at one side, leaving room at the other for the vehicles. There are many of these streets in close proximity to the retail centers and much congestion results. One-way traffic is used on such streets

tation for its wheat and corn and its cattle, its sheep, its hogs and its horses, coupled with which goes its premier position as an exporter of frozen and chilled meats. Argentina is the great food-producing land of the world, and while not so great a grain grower as the United States, it leads us in the amount of grain exports. Her exports of hides are very large.

Many Infant Industries

Enjoying as the Argentine does such a wide variety of climate, she is developing many industries which the government is also protecting by very high tariff walls. Thus in the northern part of the country around Tucuman, pronounced To-ko-man, is a great sugar area with over thirty large sugar mills. Around Mendoza, which is marked on the map, is found the great grape industry with its consequent wine manufacture. In the most northerly part of Argentina is a great territory known as the Chaco, pronounced Chaw-ko, which produces in great quantities very valuable tropical woods that are already great factors of merchandise. A leader is the red-colored tree known as Quebracho, pronounced Ka-brak-o, which is used instead of oak for tanning leather. This log is shipped to Europe in great quantities and the United States imports great quantities of the extract obtained by pulverizing and boiling the logs.

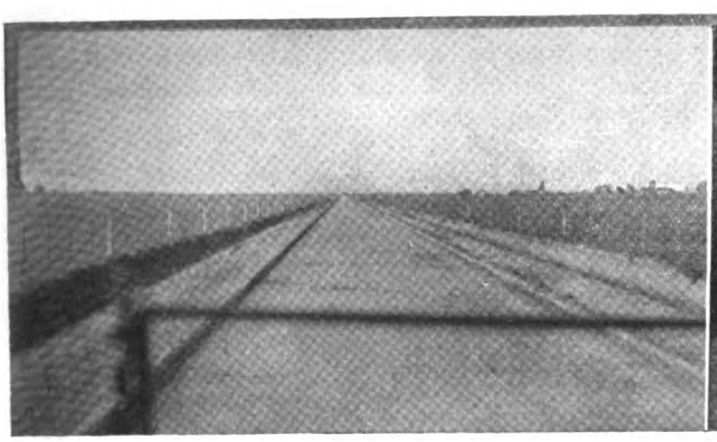
Many other industries could be gone into, but only general views are aimed at in this first article.

Buenos Aires, the Metropolis

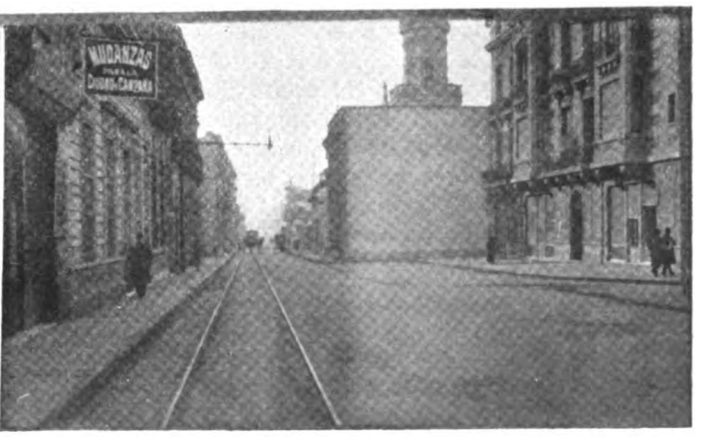
Let us briefly glance at a few of the Argentine cities: Buenos Aires comes first. It is a city that dominates Argentina just as Boston dominates New England, just as London dominates England, and just as Paris dominates all of France. Buenos Aires, pronounced Bway-nos Air-ees, is a city to be proud of and all Argentines are. It has a population of 1,800,000. That is considerably larger than Philadelphia and not so very much smaller than Chicago.

Buenos Aires is a city of great distances, and like practically all of the South American cities in Brazil, Argentina, Uruguay and Chile, is well paved. All of its streets are paved with stone blocks, not cobblestones, but square stone blocks, which give a street nearly as smooth to ride on as brick pavement. When the surface is well worn the riding is practically the same as on asphalt. As Argentina has no stone within its boundaries, all of the paving stone has been imported, much being brought from Europe as ballast and much imported from Uruguay, pronounced Oor-ah-Y. In spite of this handicap all of B. A., as it is abbreviated by many business men

(*Continued on page* 16)



One long straight stretch on the level stone road between Buenos Aires and La Plata. There are over 50 miles of road as straight and level as this. What more ideal road surface could be desired for motor trucks transporting beef from the Armour and Swift packing plants to the butchers in B. A.? Already trucks are operating over this modern highway in different classes of work. This magnificent roadway is perhaps the best in all of South America and its completion should result in a great increase in the use of motor trucks of all kinds



This view shows how Buenos Aires is widening many of its narrow streets and converting them into modern city thoroughfares. All new buildings erected along certain streets after a certain date set by the council must be set a certain distance back from the curb, as shown in the right foreground. After a certain number of years much of the street is widened in this way and when the time limit set by the city has been reached all existing buildings along the curb are wrecked and the work of widening the street completed. You see dozens of scenes just like this one in as many different parts of the city

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South America's Truck Market

EUROPE has been such a fruitful selling field for trucks in the last 2 years that many makers have not turned their eyes toward South America. This was but natural as the general conception was that nearly all of the 13 different countries comprising that continent were bankrupt, and that as Europe had been their banker, there was no use of trying to do business in a market under such discouraging conditions. Granted that perhaps both of these statements were true to an extent, there still remained the fact that South America offers a good possible selling field for trucks and that to date European trucks have largely monopolized that field, although there are a few American makes in the different countries.

In spite of all that has been said there is plenty of money in many countries in South America. The Argentine merchants say that there is plenty in the hands of the people but that, naturally, they have been hoarding it since the outbreak of the war. This was only rational for a people who knew only Europe as a money source, who bought most of their products from Europe and in whose countries billions of dollars of European money is invested. Continued war might mean the withdrawal of much of this money. This and many other problems came into the mind of the Argentine so that he became a poor spender. The same was true in many parts of Brazil and it is further true that in many parts of the different South American countries business is perhaps not more than 60 per cent normal. There are others, where, because of war demands and war prices, business is perhaps 25 per cent above normal. This applies to certain mineral sections.

The Firm Foundation

What the U.S.A. truck maker must decide is whether he hopes to take a place in the South American market or not. If he is going to do so, he must make up his mind to establish his business on a sound foundation. He will have to proceed slowly and investigate thoroughly. There is no question but that a great truck business will develop and perhaps fairly rapidly, but the great question is to go after it in a sober, business-like manner.

The U.S.A. truck maker will have to send his best men to South America to establish the business. He cannot send some glib-tongued order-taker who may snatch a few orders out of the fire and succeed perfectly in killing all chances for future business. That has already been done with some of our passenger car agents there and truck makers are urged to leave the business alone rather than handle it in a poor manner. It will be much better for U.S.A. interests to have those makers represented there who are prepared to conduct business like such concerns as the United States Steel, General Electric, Westinghouse, Fairbanks-Morse, Singer Sewing Machine, White Sewing Machine, Remington Typewriter, National Cash Register, Standard Oil, Eastman Kodak and others, which are prepared to build for the future and are further prepared for a considerable outlay at the start in order to demonstrate that they are going to stay in the country permanently and that they will carry a large stock of spare parts and give the service which any truck owner deserves. These firms are making good. They are enjoying the fruits of a rapidly-growing market. What can be said of them can be said of motor truck makers who handle their business in a similar manner. The market in limited quantities is there at present, and the future is the same as with any great growing country that nature has endowed with a soil unequalled in fecundity and a climate that is generally free from frosts and which should delight the heart of any man.

Selling a Slow Process

Catalogs printed in English and advertisements in the daily and weekly press will not sell trucks in South America. You cannot send your best salesman and expect him to send you orders from Brazil after he has been there a week, the same as you might from California or Illinois. He may be there months before a single sale is made and it may require 6 months before he has thoroughly sold a truck to a Buenos Aires dealer. If he sells one truck to a dealer he may well be happy, but if he hopes to get an agency and an order for 10 or 20 trucks he will be hopelessly disappointed. Business will not flow into the hands that way.

Let it be again repeated that a manufacturer

(*Continued on page* 25)

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Seeks a Truck Show for Detroit

Wilson Pushes Plan for Use of Michigan Fair Grounds

DETROIT, July 25—Stanley C. Wilson, secretary and general manager of the J. C. Wilson Co., builder of the Wilson truck, is actively engaged in promoting a national motor truck exhibition, to take place in Detroit on the Michigan State Fair Grounds. Despite the unfavorable action of the National Automobile Chamber of Commerce in respect to truck shows, Mr. Wilson believes that with the completion of the new coliseum at the Michigan Fair Grounds a location which is ideal will be afforded, and in the firm belief that with a tangible plan presented many manufacturers will respond, Mr. Wilson is determined to push his efforts to the uttermost.

MONTREAL SHOW JAN. 13-20

MONTREAL, QUE., July 22 — The Montreal Automobile Trade Assn. announces that the Montreal Motor Show will be held from Jan. 13 to 20, inclusive, thus preventing Montreal clashing with Chicago as in the past few years. With the many new makes of motor trucks being introduced to Montreal during the coming season it promises an interesting show. Several locations are now being investigated.

N. A. C. C. MEETS AT CHRISTMAS COVE

NEW YORK CITY, July 18—Alfred Reeves, general manager of the National Automobile Chamber of Commerce, has left this city for Christmas Cove, Me., to attend the mid-summer meeting of the Chamber at Clifton, Samuel Miles' summer home.

The meeting will be held on July 25 and the directors will leave on the next day. Following are those invited:

Hugh Chalmers, R. D. Chapin, Hudson; C. W. Churchill, Winton; Charles Clifton, Pierce-Arrow; T. Walter Drake, Hupp; C. C. Hanch, Studebaker; Wilfred C. Leland, Cadillac; Alvan Macauley, Packard; W. E. Metzger, Argo Electric; R. E. Olds, Reo; Carl H. Pelton, Maxwell; H. H. Rice, Waverly; Windsor T. White, White; John N. Willys, Willys-Overland; Col. George Pope, A. L. Riker, Locomobile, and Alfred Reeves, general manager, together with some personal friends of Mr. Miles.

JERSEY M. T. C. AFTER TUBE

NEWARK, N. J., July 18—At the meeting of the Motor Truck Club of New Jersey, held here to-night, three topics of interest were discussed. The most important subject for discussion was the proposed sites for the New York-New Jersey team tunnel, for which the club has been working consistently for over a year. Senator Charles M. Egan of New Jersey addressed the meeting on this subject. Senator Egan is a firm advocate of the project and has done much good work toward bringing it to a realization.

W. Eugene Turton, counsel for the club, brought up the question of the formation of a motor reserve corps, along similar lines to those adopted by the Motor Truck Club of America. Mr. Turton has already sent a communication to Secretary of War Baker asking for advice on the manner of formation.

The third matter discussed was also brought up by Counsel Turton and was the subject of alleged discrimination against motor trucks by Jersey City. He stated that Jersey City had closed certain important thoroughfares to heavy traffic and that such closure was working severe hardship upon truck users of the upper part of the State.

TRACTOR RATINGS COMMITTEE APPOINTED

WICHITA, KAN., July 23—The National Gas Engine Assn. has appointed a tractor ratings committee which will seek to standardize methods of rating farm tractors, both as to drawbar pull and belt horsepower. The drawbar rating favored is in pounds pull with the time element incorporated. The belt power will be in terms of horsepower. The committee will endeavor to evolve a method which will be satisfactory to all manufacturers.

Chairman of the committee is Raymond Olney, editor, *Gas Power*. Other members are: Fred Glover, vice-president, Emerson-Brantingham Implement Co.; C. M. Eason, Hyatt Roller Bearing Co.; G. T. Strite, president, Strite Tractor Co., and H. J. Buffington, chief engineer, Minneapolis Steel & Machinery Co.

TRUCK TOO FAST FOR JUDGES

UTICA, N. Y., July 22—Between 13 and 14 miles in 36 minutes and 35 seconds on a fraction over 1 gallon of gasoline, with 1 mile of hill climbing, was the sensational 2-ton truck performance that featured the fourth annual hill climb at Oriskany Falls this afternoon. In a program including motor truck, motor car, and motorcycle contests, a White truck won the commercial vehicle event for 2-ton trucks in unexpectedly short time. The truck swung back into Oriskany Falls from Knoxboro with its 2-ton load of cement and was half way up College Hill before the judges, with dinners half finished, were able to get within hearing distance of it. The judges had calculated about 1 hour for the circuit of the track and almost missed the finish.

ANOTHER CALIFORNIA TRUCK RUN

LOS ANGELES, CAL., July 19—Southern California is to have another commercial car reliability tour. Frederick Pabst, acting for the Motor Truck Dealers Association of Los Angeles, has made application to the contest board of the A. A. A. for a sanction for a commercial car run Oct. 22 and 23.

The success of the run from Los Angeles to San Diego, staged last week under the auspices of the Motor Truck Dealers Association, has assured the success of the next run, which is to be a much harder and longer run. It is planned to have the trucks leave Los Angeles and go out across the desert to Palmdale, then to Victorville and Barstow, the first day, making Barstow the night control. The second day the run would be from Barstow to San Bernardino, and then into Los Angeles over the boulevards.

This run would be approximately 400 miles and the course would include every road condition to be encountered by the motor truck in operation in the Southwest.

Britain to Build Its Own War Trucks

A Standardized 4-Tonner — May Affect U. S. Sales

LONDON, July 12—Standardization has been developed to such a degree that England is now prepared to produce one type of truck in all factories for the use of her own and allied armies. Drawings and jigs will be supplied by the central authority to all the factories required to build trucks, and these factories will be obliged to build to this design, to the exclusion of their own models. A big series will go through immediately, and, it is declared, the output will be so great there will be no further need for American trucks.

The new design is a 3- to 4-ton model with four-cylinder engine of 5 by 6 in. bore and stroke. It has a four-speed gearbox and final drive by overhead worm. Hotchkiss drive is not incorporated. Ignition by high-tension magneto only is fitted; it is no longer considered necessary to have a secondary ignition by batteries. All-metal wheels are employed, both of the cast steel and pressed steel types. It has been necessary to adopt the two types on account of the big output contemplated.

In designing this truck everything freakish has been avoided and only features which have proved satisfactory under actual war conditions have been incorporated. The 5 by 6-in. four-cylinder engine gives a bigger piston displacement than is usually considered necessary for a 3- to 4-ton load under either English or French conditions. It is intended, however, that the new truck shall be as suitable for Russian service as for work on the French front, hence the more powerful engine. The design has been developed by an engineer who has had experience with all makes and who has enjoyed exceptional opportunities of observing the defects of trucks under war conditions. Obviously engineers with vested interests find much to criticise in the new design, but the authorities override all their objections and insist on everybody producing the one type of truck.

STANWELD MERGER OFF

CLEVELAND, OHIO, July 23—Failure of interested parties to agree on terms of sale has resulted in a break-off of negotiations to sell the controlling interest of the Standard Welding Company to the United Motors Corporation of New York. Negotiations have been going on for several weeks. It is understood that a difference of $7,000,000 stood between the prospective purchaser and the Standard's price when negotiations were first opened.

U. S. PAYS 23.3 CENTS FOR GAS

WASHINGTON, D. C., July 15—A contract has been awarded the Columbia Oil Co., Roslyn, Va., to furnish the annual supply of gasoline for delivery at the various army posts in the vicinity of Washington, for the fiscal year ending June 30, 1917, at a price of 23.5 cents per gallon.

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Bay State Motor Traffic Increases 129 Per Cent in 3 Years

Motor Trucks Jump from 3 Per Cent of Total Traffic in 1912 to 6 Per Cent in 1915—Horses Decrease 18 Per Cent

BOSTON, MASS., July 28—Motor traffic in Massachusetts has increased 129 per cent in 3 years, while horse traffic has fallen off 18 per cent in the same period, according to the traffic census made by the Massachusetts Highway Commission and published in its annual report for the fiscal year ending Nov. 30, 1915. This report is just off the press and contains many other facts which are enlightening.

"In Massachusetts," states the report, "the traffic using our roads is constantly increasing, but it is changing much more rapidly than it is increasing. . . . The most important feature . . . is not the total increase, but the change in the class of vehicles that are using the highways.

"Motor vehicles," continues the report, "which had increased in numbers 131 per cent from 1909 to 1912, from 96 to 222 a day, again increased 129 per cent from 1912 to 1915, increasing from 222 a day to 500 a day."

"On the other hand," states the report, "the number of teams using the roads decreased on the average 14 per cent, from 151 a day in 1909 to 129 a day in 1912, and again the number decreased 18 per cent, from 129 a day in 1912 to 106 a day in 1915."

These figures were obtained by a census taken by the commission on the State highways at 238 stations in various parts of the State in 1909. In 1912 a similar count was taken at 156 stations and in 1915 at 192 stations. Census was also taken at various parts of Boston and its park system. The count was taken for 14 hr. each day, every vehicle passing the observers being counted, regardless of direction. The results of these counts were averaged to secure the above figures.

The report continues:

"The net increase in traffic was 72 per cent from 1912 to 1915.

"The total number of vehicles using the State highways has increased 145 per cent in the last 6 years, from an average of 247 vehicles a day in 1909 to an average of 606 vehicles a day in 1915.

"What is even more astonishing is the change in the traffic. In 1909 the average number of horse-drawn vehicles was 151 a day, and there were only 96 motor vehicles a day.

"In 1915, 6 years later, there were only 106 horse-drawn vehicles a day, as compared with 500 motor vehicles. The horse-drawn vehicles have decreased 30 per cent, while the motor vehicles have increased 420 per cent in the last 6 years.

"The decrease in horse-drawn vehicles during these 6 years has been 35 per cent in the light, single-horse vehicles, 28 per cent decrease in the two-horse light vehicle, 11 per cent decrease in the single-horse heavy vehicle, and 12 per cent decrease in the heavy two-or-more-horse venicle."

The report goes on to point out that motor trucks are rapidly increasing in numbers and are going long distances over the roads, drawing the very rational conclusion that the remedy for the consequent rapid depreciation of old-fashioned roads is "stronger and deeper foundations, as well as stronger and more expensive surfaces on all main roads." Concerning the growth of motor haulage traffic, the report states:

"There were practically no motor trucks on the State highways in 1909. In 1912, however, there were 11½ a day on the average, and they constituted 3 per cent of the traffic.

"In 1915 the average number of motor trucks was 38 a day, or 6 per cent of the traffic. They just about equalled the light horse-drawn vehicles, of which there were 39 a day in 1915. One must realize that this 38 a day is the average number at all the 192 stations."

Striking results from the census are found in the tabulation of averages from the counts. In 1912 the average total number of trucks passing the counting stations was 1800, or 3 per cent of all the traffic, passenger and commercial. In 1915, 7260 trucks passed the observers, constituting 6 per cent of the total.

DEMANDS 5-CENT BUS FARE

NEW YORK CITY, July 17—The League for Municipal Ownership and Operation of New York City, through its president, Frederic C. Howe, has demanded that the Public Service Commission require the Fifth Avenue Coach Co. to operate its buses for a 5-cent instead of the present 10-cent fare. Mr. Howe quotes the report of the Public Service Commission to show that in 1915 the net income on the capital stock of $50,000 was $364,174.20, or about 725 per cent. This profit, Mr. Howe thinks, is excessive, and as a common carrier and therefore clearly under the jurisdiction of the commission, the coach company should not be permitted to continue to charge double the fare of any other similar carrier in the city. Mr. Howe also avers that the traffic on the buses would increase greatly if a 5-cent fare were charged.

MOTOR LICENSES BUILD ROADS

WASHINGTON, D. C., July 15—Motor vehicle license fees, collected by the various States, constituted 7 per cent of the funds expended on road and bridge construction in the United States in 1915, according to Circular No. 59, issued by the U. S. Department of Agriculture. No less than 2,445,664 motor vehicles were registered in 1915. There is 2,375,000 miles of public road outside of incorporated towns and cities, so that there is more than one motor vehicle for every mile of country road. The sum of $18,245,713.09 was collected in all of the States as motor vehicle license fees, of which $11,555,459.26 was expended for State roads and bridges and $4,657,929.39 for local road work. An average of $7.46 was returned by each motor vehicle in the United States. This includes registration fees and fines and penalties turned in to the State road funds.

The pamphlet was issued July 6, 1916, and contains, in addition to tabulated information along the above lines, a complete compendium of registration and license fees in force in the different States as of Jan. 1, 1916. Copies may be secured from the Superintendent of Documents, Government Printing Office, Washington, D. C., at 5 cents per copy.

INDUSTRIAL INVENTORY NEARLY COMPLETE

WASHINGTON, D. C., July 22—Congress has practically completed legislation that will carry out the entire program of the Committee on Industrial Preparedness of the U. S. Naval Consulting Board to establish a firm and enduring foundation for the nation's defense.

There will also be incorporated into law the committee's carefully-worked-out plans to teach American manufacturers now, in time of peace, through annual educational orders, how to turn out war munitions and all other military and naval supplies when needed. It likewise seems probable that legislation will soon be passed adopting the committee's measure for an industrial reserve, so that in time of war the skilled mechanic shall be kept at home on the job where his services are most needed to feed the firing line.

This legislation comes during the closing days of the committee's remarkable three months' campaign, made with a volunteer, unpaid organization of business men and engineers. It has been an epoch-making work and marks definitely the new era of the engineer in the preservation of national governments.

Although the committee's great industrial inventory had been making excellent progress, national conditions recently became such that Chairman Howard E. Coffin sent urgent telegrams to the chairmen of the committee's State boards directing them to make all possible haste to gather the industrial information so vital to the army and navy of the United States. At the same time Secretary of War Baker detailed five officers of the regular army service, two of them members of the general staff, to the committee's offices in the Engineering Societies Building, New York, to assist in rushing the work to the limit and to gain immediate benefit for the government of the large amount of data already obtained.

As a result of the increased vigor of the work of the great army of engineers and chemists under Chairman Coffin and Supervising Director W. S. Gifford, reports are coming in from the field in even greater quantity than before. The engineers and chemists are members of the American Society of Civil Engineers, the American Institute of Mining Engi-

Coming Commercial Vehicle Events

Aug. 15	New York City, Meeting of the Metropolitan Section, S.A.E., Automobile Club of America. Subject, South America.
July 31-Aug. 4	St. Louis Mo., National Tractor Demonstration.
Aug. 7-11	Fremont, Neb., National Tractor Demonstration.
Aug. 14-18	Cedar Rapids, Iowa, National Tractor Demonstration.
Aug. 21-25	Bloomington, Ill., National Tractor Demonstration.
Aug. 28-Sept. 1	Indianapolis, Ind., National Tractor Demonstration.
Sept. 1-9	Cincinnati, Ohio, Good Roads Show, Music Hall.
Sept. 4-8	Madison, Wis., National Tractor Demonstration.
Sept. 9	New York City, Annual Outing, Motor Truck Club of America, Inc.
Sept. 10-16	Milwaukee, Wis., Second Annual Motor Show, Machinery Building.
1917	
Jan. 13-20	Montreal, Que., Can., Montreal Motor Show.
Feb.	Newark, N. J., Passenger Car and Motor Truck Show, First Regiment Armory.

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neers, the American Society of Mechanical Engineers, the American Institute of Electrical Engineers and the American Chemical Society. The committee is inventorying scores of thousands of plants to know exactly how each one of them can adapt its equipment to produce the thousands of things, from shells to shaving brushes, necessary for the government's use in a national emergency.

There are more than 30,000 manufacturing concerns in the United States doing a business of over $100,000 a year, and all of these are being inventoried, to say nothing of many smaller plants with equipment peculiarly suited to turn out material for the fighting line.

Only a few business men have refused to give the desired information, usually to yield on a fuller explanation of the committee's purpose and the country's need.

LATIN-AMERICAN TARIFFS EASIER

WASHINGTON, D. C., July 16—The publication of a notable report on the South American tariff systems is announced in a letter from Secretary Redfield to Secretary McAdoo. The report is issued by the Bureau of Foreign and Domestic Commerce of the Department of Commerce, and is much more than a mere reprint of tariff schedules. It is concerned chiefly with the actual application of the tariff laws and the spirit in which they are administered, and is aimed to clear up many of the difficulties that have in the past beset American exporters.

The American public realizes at least in part the intricacy of South American tariffs, criticizes the numerous surtaxes, and resents the frequent heavy fines imposed. But it is not generally known that surtaxes are just as severely criticized by South American writers, that the fines are severe partly because the moderate force of trained inspectors necessitates much reliance on the exactness of the importer's declaration, and that the complexity of the systems is due largely to the financial dependence of the countries on customs revenue to meet varying national expenditures.

Prepared primarily for the use of exporters, the new report gives full information regarding South American tariffs and customs methods, describing under each country the system in force and contrasting in the introduction corresponding features of the various systems. But it goes much farther. Variations in practice are explained as well as noted, and underlying causes are made clear. The report was not superficially prepared. It was written, after personal investigation and years of study, by Dr. Frank R. Rutter, Assistant Chief of the Bureau of Foreign and Domestic Commerce and formerly Chief of the Division of Foreign Tariffs of that Bureau.

The new report is entitled "Tariff Systems of South American Countries," Tariff Series No. 34, and is now on sale at 25 cents a copy by the Superintendent of Documents, Washington, and by the District Offices of the Bureau of Foreign and Domestic Commerce.

Federal Road Fund of $5,000,000 Is Apportioned Among States

Texas, with $291,927, Receives Largest Slice—Delaware Gets Smallest—Larger Appropriations for 1918-1921

WASHINGTON, D. C., July 25—The Secretary of Agriculture on July 21 certified to the Secretary of the Treasury and the Governors and State Highway Departments of the several States the following apportionment of the $5,000,000 of federal road funds available for the fiscal year ending June 30, 1917. This is the first installment of federal moneys to be apportioned to the States under the Federal Aid Road Act, approved July 11, 1916. Before making the division among the States, the secretary, in accordance with the act, deducted 3 per cent, or $150,000, needed for administering its provisions. This left $4,850,000 to be apportioned among the States, one-third in the ratio of area, one-third in the ratio of population, and one-third in the ratio of mileage of rural delivery routes and star routes. The apportionment on this basis gives the following amounts for the several States, tabulated below in the order of the size of the apportionment for each State:

Texas	$291,927.81
New York	250,720.27
Pennsylvania	230,644.17
Illinois	220,926.23
Ohio	186,905.42
Missouri	169,720.41
California	151,063.92
Iowa	146,175.60
Michigan	145,783.72
Kansas	143,207.40
Minnesota	142,394.06
Indiana	135,747.62
Georgia	134,329.48
Wisconsin	128,361.07
Oklahoma	115,139.00
North Carolina	114,381.92
Tennessee	114,153.48
Nebraska	106,770.81
Alabama	104,148.90
Virginia	99,660.71
Montana	98,287.19
Kentucky	97,471.91
Mississippi	88,905.84
Colorado	83,690.14
Arkansas	82,689.10
South Dakota	80,946.02
New Mexico	78,737.81
Oregon	78,687.37
North Dakota	76,143.06
Massachusetts	73,850.95
Washington	71,884.28
South Carolina	71,807.64
Arizona	68,513.52
Louisiana	67,474.66
Nevada	64,398.30
Wyoming	61,196.82
Idaho	60,463.50
New Jersey	59,212.68
Utah	56,950.15
Florida	55,976.27
West Virginia	53,270.46
Maine	48,451.50
Maryland	44,047.22
Connecticut	31,090.44
Vermont	22,844.47
New Hampshire	20,996.62
Rhode Island	11,665.71
Delaware	8,184.37
Total	$4,850,000.00

The apportionment indicated above is only of 1 year's funds. For succeeding fiscal years the act appropriates the following amounts:

1918	$10,000,000
1919	15,000,000
1920	20,000,000
1921	25,000,000

The act requires that the apportionment for each year shall be made in the same manner. Different sums are appropriated for each year and the apportionment must also take into consideration the population as shown by the latest available federal census and the mileage of rural delivery and star routes as shown by the certificate of the postmaster general for the next preceding fiscal year. A new apportionment, therefore, must be announced for each fiscal year.

The apportionment as given above does not take into consideration the $1,000,000 additional appropriated each year for 10 years for the development of rural roads in the National forests.

U. S. COMMANDEERS OUTPUTS

WASHINGTON, D. C., July 19—Foreign buyers of American trucks are now meeting competition in the form of no less a person than Uncle Sam himself. Under the new preparedness measures recently enacted by Congress, the Government in time of need may require manufacturers of Government supplies to stop production for other customers and concentrate on the filling of Government orders on pain of having their plants taken over by Government officers for operation as required.

This law was put into effect for the first time on the occasion of the recent purchase of trucks for the Mexican border, when such factories as the Four Wheel Drive Auto Co., Clintonville, Wis., the Packard Motor Car Co., Detroit, the White Co. in Cleveland, and various others were obliged to cease work on European war orders long enough to complete the contracts awarded by the Quartermaster Department of the U. S. Army for 1½ and 3-ton trucks.

HOOSIERS START RESERVE CORPS

SOUTH BEND, IND., July 24—Prominent South Bend citizens have joined in a movement for the organization of a volunteer motor car corps for the purpose of keeping the war department advised where it will be possible to secure motor cars in South Bend with the least delay should an urgent need arise. The movement was originated by Edgar A. Stoll, of South Bend, who has prepared a bill to be presented to Congress, which authorizes the formation of the volunteer motor car reserve corps.

HOOSIER MAIL VIA FORDS

INDIANAPOLIS, IND., July 18—Sixteen motor delivery cars—all Fords—have replaced the former horse-drawn wagons on the rural routes of Marion County, Indiana. Thirty-two wagons have been withdrawn from use, and the routes, formerly 25 miles each, have been increased to 51 or 57 miles. In spite of this, greatly improved service is anticipated. The Fords are all equipped with special bodies, and present a very pleasing appearance. The bodies have a capacity of 80 cu. ft., and are designed to carry 750 lb. of mail.

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Bay State Headlight Law Enforced

Truck Lamps Must Throw 150-Ft. Beam at 3½ Ft.

BOSTON, MASS., July 24—Motor truck makers who have not paid any attention to the new Massachusetts headlight law may find the sale of some of their vehicles blocked now that a crusade has been started all through the State to enforce the law. Many of the commercial vehicles are so built that the lamps are 4 or more feet above the ground. And so they do not conform to the law. They are not all powerful enough to throw a beam 150 ft. ahead so as to pick up an object distinctly. Some of them do not show light enough to discern an object on either side 10 ft. away and 10 ft. in front. And, being so high, they throw a glare higher than 3½ ft. 50 ft. ahead of the machine.

The Massachusetts Highway Commission has now sent to every chief of police throughout the State a letter calling attention to the fact that although the law has been in operation since Jan. 1 and thousands of owners have paid no attention to it, there have been but forty arrests and five convictions. Owners of motor trucks have paid very little heed to it, as if the law were intended solely for passenger cars. With a crusade started from Boston to the New York State line, there will be something doing, and as Police Commissioner O'Meara has instructed all his men in Boston to enforce the law, many arrests of truck drivers may be expected. Many trucks make inter-city trips now, and where they escape one set of officials in their home places they will be held up elsewhere. It will not be possible on some of the trucks to bend the headlights down, for that would not give distance if the glare were eliminated. The lamps will have to be lowered and rewired. The truck makers will have to meet the law, and as it was held up some months before it went into effect, the Highway Commission feels that there is no excuse for further neglect. If any owner escapes on a technicality in court and a truck figures in an accident, both the license to drive it and the registration to use it will be revoked.

FERRY DISCRIMINATION IN HUB

BOSTON, MASS., July 24—Motor trucks are again the object of proposed discriminatory measures, this time by Mayor Curley of Boston. He has just announced that he is considering increasing the fees for using the ferries to East Boston, jumping the present tolls up 150 per cent for motor vehicles. He has not said he would increase the fees for teams. Claiming that there was a deficit of $40,000 last year in the operation of the ferries he says motor vehicles should pay 25 cents a trip instead of 10 cents.

As the ferries run to East Boston and back only it would be severe discrimination against the business houses in that section. There are a large number now using motor trucks and as South Boston, Charlestown, Chelsea and Cambridge all have bridges, while East Boston has none, to raise the ferry tolls would prove burdensome. Some of the trucks would pay at least $2 and others more per day, which totaled up at the end of the year would be $300 or more. The State is planning to develop the water front there and so the citizens are anxious to build up the district. All the Cunard steamers dock there; the Boston & Albany R. R. has a freight terminal there; there are some show plants in the section, and all the marine building and repairing is in East Boston.

When the Mayor announced his plan the Bay State A. A. laws and ordnance committee dispatched a letter requesting a conference. He has not replied to it yet. The Boston Automobile Dealers Assn. and the Boston Commercial Vehicle Dealers Assn. also requested that he arrange a conference on the matter. Letters have been sent to the representatives in East Boston requesting them to start a counter agitation against the plan. A few years ago Mayor John F. Fitzgerald conceived a similar plan on the grounds that it was a fire hazard to carry motor vehicles, and that the rates were smaller than in New York.

He gave the motor representatives a conference when it was pointed out that it was a tax on business; that the vehicles were not a fire menace; that they took up less room than the horse-drawn vehicles and it was easier to handle them; that the rates were already larger than the New York tolls, etc. When the conference ended, Mayor Fitzgerald made the statement right away that he never would be a party to taxing business, and that he had seen things in a clearer light. So there is hope that Mayor Curley may see it the same way, for more commercial vehicles use the ferries than the passenger cars, the latter going around through Chelsea.

3-TON LOAD LIMIT IN COLUMBUS

COLUMBUS, OHIO, July 17—To operate a truck through the streets of Columbus loaded above 3 tons with material that will admit of separation is a misdemeanor and punishable by a fine of from $5 to $50 and imprisonment of from 5 to 20 days.

This regulation was found in an old city ordinance, codified in 1896, which has not been repealed or declared invalid, according to City Solicitor Scarlett, who forwarded the information to Safety Director Barry as a means whereby gravel trucks may be stopped from operating through the night in the vicinity of Bryden Road and East Broad Street.

It is said that the gravel trucks carry as high as 10 tons to a load. Scarlett says a provision will be made in the new traffic ordinance to stop night traffic that prevents residents from sleeping.

NEW ARMLEDER PRICES

CINCINNATI, OHIO, July 17—Armleder trucks after July 15 will be sold at a new scale of prices, superseding all previous lists. These prices are:

Model	Tons Capacity	Drive	Price
HC	2	chain	$2,200
EC	2½	chain	2,350
HW	2	worm	2,400
KW	3½	worm	3,250

A new series of the 2-ton worm-driven model will be announced very shortly. This new series is designated HW-2 and will be similar to the old series except for minor refinements of detail.

NEW MAKER OF PAULDINGS

ST. LOUIS, MO., July 20—H. A. Woerman, under the name Anchor Auto Co., of this city, has purchased the business of the St. Louis Motor Truck Co. He will continue to manufacture Paulding trucks and will also give service to present owners of these vehicles. He has made extensive improvements in the plant and expects to give users better service than ever. The former superintendent of the St. Louis company has been retained in the same capacity by the Anchor company.

Packard Earnings 18 Millions

Over 7-Year Period — 6 Millions Expected for 1916

DETROIT, MICH., July 23—In a comparative statement of its capitalization, net worth, dividends and surplus for the 7 years beginning Sept. 1, 1909, and ending at the close of the current fiscal year on Aug. 31, 1916, the Packard Motor Car Co. shows aggregate earnings of $18,636,506 after deducting more than $9,000,000 for depreciation during this 7-year period. The earnings for the present fiscal year, 9 months of which are based on actual figures and the last 3 months estimated, amount to $6,050,000 as compared with $2,769,518 for the year 1914 to 1915, which was the best previous earnings for the company. In offering this statement, F. R. Robinson, comptroller of the company, points out that the figures for the fiscal year—1915 to 1916—contain a conservative estimate covering the last quarter of the year and after paying regular preferred and common cash dividend and deducting the 10 per cent common stock dividend declared Feb. 1, 1916, and the 50 per cent common stock dividend to be distributed Aug. 1, the balance in the surplus account the end of the year will undoubtedly exceed $6,376,344. In the 7 years the capital stock of the company has been increased from $5,000,000 common and $5,000,000 preferred to $11,656,930, common stock and $8,000,000 preferred. In the same period the net assets have increased from $10,766,847 to $26,003,274.

GARFORD INTERESTS PROSPER

LIMA, OHIO, July 17—The Geiger-Jones Co., which controls the stock of the Gramm Motor Truck Co., of Lima, builder of Garford trucks, is offering for sale a limited amount of the new issue of preferred 7 per cent cumulative stock at 101. The stock was authorized at a meeting June 17 by more than 80 per cent of the stockholders of record.

In the statement issued with the call for stock subscriptions, the company is shown to have had profits of $579,000 in 1915 after making deductions and other charges. In other words the profits were sufficient to pay the preferred dividends and 66.4 per cent on the common stock outstanding at the end of the year. The dividends on the preferred are payable quarterly, in January, April, July and October. The stock is non-taxable in Ohio. The business of the company in 1915 amounted to more than $4,000,000. The organization is devoting its attention to the development of commercial business both domestic and foreign, and the company has accepted no war business during the present year.

WICHITA FALLS TO EXPAND

WICHITA FALLS, TEX., July 24—The Wichita Falls Motor Co. has increased its capital stock from $100,000 to $400,000. It has met with much success in manufacturing motor trucks at its plant here and it is stated that it plans to greatly enlarge the business.

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Big Fire Fails to Stop Atterbury

Production Continues—Twenty-Five Chassis Burnt

BUFFALO, N. Y., July 25—Despite the recent $100,000 fire the Atterbury Motor Truck Co. is continuing to do business. In fact, two new 2-tonners were sold before the ruins had cooled. Since three-quarters of the plant is still in working condition, orders can be filled within a week's time.

The heat was so great that the giant steel truck frames collapsed like limp linen. The cast aluminum radiator tops disappeared as if evaporated; 1400 deg. is the estimated heat in the final assembly room during the fire. The conflagration was discovered by a boy on a bicycle, who saw a flame shoot through the skylight of the final assembly shop at 10.35 o'clock at night. The lad found the watchman of the plant, James Fallon, making his rounds in the office. In three minutes the first firemen had arrived. The final assembly and the paint shops were then roaring with flames which had burst through the skylights of the saw-tooth structures, one story in height. A second alarm was sent in.

In 10 minutes Fire Chief McConnell was at the blaze. He feared that the entire plant was doomed and sent in a third alarm. The firemen by hard work confined the fire to the two small buildings, keeping it from the long, high L-shaped structure which fronts on Elmwood and Hertel avenues and from the square building enclosed by the L, which is used as a final storage room before shipment.

J. R. Spraker, the general manager, estimated the loss at $100,000. He said that there were twenty-five motor trucks in the final assembly building. They were nearly completed. The fire spread so furiously and with such intense heat that it was impossible to save any of the chassis. Fire Chief McConnell said that the almost instant spread of the flames was due probably to the fact that the fire started near the paint shop, with its inflammable materials. The final assembly rooms are directly connected and the floors were oil-soaked from the work of assembly. The sprinkler system with which the plant is equipped worked, but was no check.

There will be no let up in production because of the fire. Mr. Spraker said there is plenty of room in the rest of the plant to take care of the trucks under construction. In other buildings of the plant the bodies, motors and other parts of the trucks are made and put together.

MIAMI TRAILERS FOR DELCO-LIGHT

DAYTON, OHIO, July 25—The Domestic Engineering Co., a subsidiary of the Dayton Engineering Laboratories Co., builder of the Delco electric lighting, starting and ignition system for motor vehicles, has inaugurated a campaign on a grand scale to market the Delco farm lighting system. In this work, travelers will be sent to all parts of the country with demonstration outfits. The logical manner of conveying these outfits will be on trailers, drawn by the runabouts used by the travelers.

Experiments have been conducted by the Delco company with the Miami trailer. These experiments have proven so successful that all travelers for the company have received recommendations from the Delco company that they adopt the special outfit developed for the purpose by the Miami Trailer Co., Miami, Ohio. A description of the outfit will be published in THE COMMERCIAL VEHICLE in a later issue.

STANLEY IN KEROSENE CARBURETER PROJECT

BOSTON, MASS., July 24—F. E. Stanley, who is building some railroad motor cars, utilizing his type of motors on a large scale, was the central figure in a demonstration of the new type of carbureter using kerosene for fuel last week. The device was perfected by Fred D. Jordan of Lewiston, Me., and so, with Dr. E. R. Hackett, who is interested in the device, they started for Boston in a Ford car, using the new carbureter, to show it to Mr. Stanley and others. Using a low-grade of kerosene, such as can be bought for 10 cents a gallon, the new device gives a mileage of from 35 to 40 miles, as against 18 or 20 on 28-cent gasoline on a Ford. The trouble from carbon deposits is overcome, and the motor can be run almost indefinitely without requiring the spark plugs of the cylinder heads to be cleaned. Mr. Jordan says that the carbureter would be valuable for truck owners who find that they use a lot of gasoline because their machines make so many stops and the vehicles are so often overloaded. He has some men interested financially in the device and they may start making them in Maine.

ADAMS TRUCKS NO MORE

FINDLAY, OHIO, July 19—The Adams Truck, Foundry & Machine Co., of this city, which 2 years ago changed its name to the above from that of the Adams Bros Co., has discontinued the manufacture of Adams commercial vehicles temporarily to concentrate on foundry and machine shop work. The Adams brothers started manufacturing trucks in 1910 and consistently followed their original plan of design, which was that commonly termed the French type, the engine being under a sloping hood, with the radiator on the dash and final drive by double chains.

RYAN CONTROLS STROMBERG

ALBANY, N. Y., July 22—A charter has been granted to the Stromberg Carburetor Co. of America, under the control of Allan A. Ryan & Co., and a syndicate of prominent banking interests in New York City, which recently incorporated the Stutz Motor Car Co. The directorate of the new company includes William Rand, E. F. Meniken and K. R. Howard, the first two being connected with the law firm of Jerome, Rand & Kresel, 37 Wall Street, New York City.

The company has issued 50,000 shares of no par value and will do business with $250,000.

The stock has been listed on the New York City curb and was traded last Thursday on a when-issued basis. On the turnover of 1500 shares in this issue all but 100 shares changed hands at the subscription price of 42. Before the close of trading it was announced that the stock had been oversubscribed.

C. W. Nash Buys Entire Jeffery Stock

Business to Be Continued—Price Was 9 Millions

KENOSHA, WIS., July 14—The Thomas B. Jeffery Co. has been purchased by C. W. Nash, who will sever his connections as president of the General Motors Co. on Aug. 1, at which time he will locate in Kenosha.

The new arrangement is not a merger in any sense of the word, states the Jeffery company, and no financial manipulation enters into the deal. Jeffery policies will be continued and enlarged upon.

The capital stock of the Jeffery company was $3,000,000, but it is said the price paid is $10,000,000.

HOOD STARTS TRADE BUREAU

DETROIT, July 25—Wallace C. Hood, for 12 years identified with the motor industry and formerly sales manager for the Chalmers, Metzger, Empire and other companies, has established the Hood Service Bureau, to represent manufacturers who have no connections in Detroit.

GRAY & DAVIS TRUCK STARTER

BOSTON, MASS., July 27.—Gray & Davis, Inc., one of the pioneer makers of electric starting and lighting equipment, has just announced a new combination starting, lighting and ignition outfit for motor trucks, the feature of which is that it is designed for use on either solid or pneumatic tires. This rugged construction is attained by making the frames and brakets one-piece castings, secured by electric welding and bored at one operation to secure proper alignment.

I. M. C. ADOPTS SERVICE POLICY

NEW YORK CITY, July 27—The N. A. C. C. Standard Service Policy, adopted by the National Automobile Chamber of Commerce, June 8, 1916, has been adopted by the International Motor Co., New York City, builder of Mack and Saurer trucks, and giant posters have been issued to branches and agents for prominent display. This policy represents the best practice of the members of the Chamber and has been settled upon as universal practice for these manufacturers. The policy is based on the N. A. C. C. standard warranty.

FIRESTONE SALES INCREASE 38 PER CENT

AKRON, OHIO, July 17—Since 1910-11, when the Firestone Tire & Rubber Co. moved into the new factory, the sales have grown from $7,462,581.17 to $25,187,884.33, making a total increase of 257 per cent for the past 5 years. This past year, 1915-16, the increase to June 1 was 38 per cent over the showing of last year.

FALLS MACHINE CHANGES CONTROL

MILWAUKEE, WIS., July 22—A well-defined report from Sheboygan Falls, Wis., says that the Falls Machine Co., Sheboygan Falls, manufacturer of small, high-speed motors has passed into other hands.

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New York Militia Gets Red Cross Truck

Can Travel 72 Hours in Desert Without New Supplies

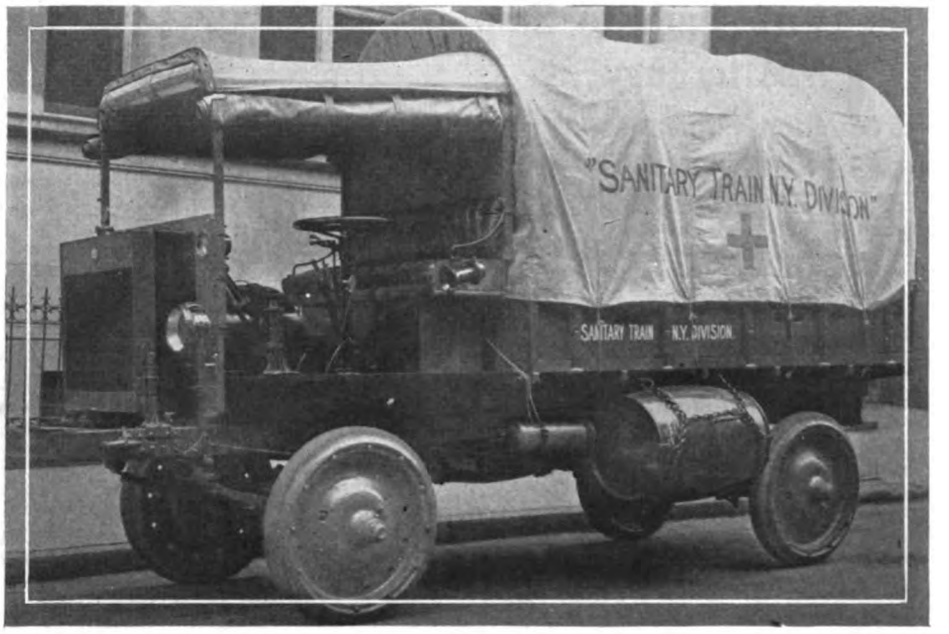
NEW YORK CITY, July 17—Capable of traveling 72 hr. in a desert without the need for replenishing its supply of gasoline, oil or water, the special 2-ton Jeffery Quad shown in the accompanying illustration was to-day presented to the New York National Guard by Mrs. Cornelius Vanderbilt of the American Red Cross Society. The vehicle has already been shipped to the Mexican border by express, together with six Trailmobiles. each of which is fitted with stretchers to accommodate four wounded men.

The truck will be manned by two drivers, six nurses and two doctors. The cruising radius of the outfit will be more than 400 miles, the additional gasoline necessary over that carried in the regulation tank, under the driver's seat, being taken along in steel barrels slung from beneath the body platform on both sides of the truck, as shown in the accompanying illustration. In all, 134 gal. of gasoline, 20 gal. of lubricating oil and 300 gal. of fresh water are carried, the water being contained in a wooden tank inside of the truck body directly aft the driver's seat.

The vehicle is fitted with the regulation Jeffery cab, together with a canvas top stretched over semi-circular bows. The truck also carries a full equipment of medical supplies in air-tight containers, in addition to tires for both the truck and the trailers. The equipment was sold by the Poertner Motor Car Co., New York City, and was consigned to Lieutenant Colonel Terriberry, Surgeon of the Sixth Division, New York National Guard, now stationed at MacAllen, Tex.

The great need for a hospital vehicle carrying a large surplus of fresh water is emphasized by a report received last week from Charles R. Serfass, stationed at Columbus, N. M., by the B. F. Goodrich Co., Akron, Ohio, in which he states that even in the concentration camps of the militia great difficulty has been experienced in establishing adequate sources of water supply. The lack of water has already caused a considerable amount of hardship for the State troops, many of whom arrived in the land of the hot sun fresh from pursuits in civil life without any great degree of conditioning.

The Government is now drilling wells about every 2 miles along the border. This work is proceeding slowly, because each well has to be equipped with a gasoline pumping engine and a reservoir tank.



A special 2-ton Jeffery Quad presented to the New York National Guard by Mrs. Cornelius Vanderbilt of the American Red Cross Society. The vehicle has been shipped to the Mexican border by express. It is capable of traveling 72 hours in a desert without replenishing its supply of gasoline, oil and water

South America's Field For the American Truck

(*Continued from page* 9)

in ordinary conversation, has well-paved streets. This must be taken literally; in fact, it will be one of the great surprises of any visitor from the United States to see the extent of the pavement and to note how well it has been done. It is a job to be proud of. In B. A. you can take longer rides over good pavements than you can in Chicago. In one direction you can reach the extreme limits of one suburb in which the municipal slaughter houses are located on good stone pavement all of the way and on streets as wide, if not wider on the average, than State Street, Chicago. You can make similar trips in three other directions from the center of the city to the confines, and on the fourth side the city borders on the de la Plata River, just as Chicago does on Lake Michigan.

Not a Good Truck Center

But B. A. is not a good truck town. It has not nearly as many trucks as Rio, but it deserves to have four times as many as Rio. Here is a city that the American truck maker should investigate carefully and one or more special articles will follow, taking up its particular problems. The light delivery movement has started, and since the writer reached here a large department store has placed an order for thirty Studebaker delivery vehicles. This order stands out conspicuously as being the first big order of United States goods in this particular field. The order gains in prominence when you are advised that the purchase was made by a big department store owned very largely by British capital, for British interests own nearly all of the big department stores there. Perhaps the picture of B. A. will gain added color by stating that there are three or four department stores here that are second only to such concerns as Marshall Field, Wanamaker and Altman in the United States.

Other Argentine Possibilities

But to be brief at present: Argentina has many other cities, none in a class with B. A., but all growing and many with prominent futures. We have mentioned Tucuman, which is the center of the sugar industry and which is largely confined to the manufacture of this product alone. There is not much opportunity for trucks except in the sugar field. There it will be competition between the motor truck and the narrow-gauge railroads which run through the plantations and bring a goodly portion of the cane to the mills. Many horse and ox wagons are used and there is a real possibility for the motor truck. More details will follow later.

We might refer to the Mendoza grape region, which is in the west side of the country where the rainfall is very slight and where irrigation is relied upon. There conditions are very favorable for motor truck use, particularly because of the soil

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and the lack of rainfall. Good roads are the rule.

Then there is the great growing port of Bahia Blanca, a real giant in the making and a port which taps perhaps as great and rich a grain-producing area as the world can boast of. Already it is a thriving city of 230,000 population, and with the amount of shipping it does there is already a good truck field.

The Farm Market

Lastly, we might pick out the great possibility of using the motor truck on the farm. This makes necessary a little detour from our general thought in order to give a correct conception of what a farm in Argentina is. To start with, obliterate any conceptions of a farm as you have gained it from Illinois, Nebraska, New York or Ohio. On the Argentine *pampas* a farm is not measured in acres but generally in square leagues. From school days you recall a league as being equal to 3 miles, so that a square league is equal to 9 square miles. Carrying this mathematical problem further, a square mile is 640 acres and a square league nine times this or 5760 acres. But many farmers have ten, fifty and 100 square leagues and many have more than this. There are a few farms in Argentina that are as long as from New York to Philadelphia and from 8 to 10 miles wide. Here the farm is not called a farm or even a ranch but a Spanish name, *estancia*, is used. *Estancia* is pronounced es-stan-see-ah.

The South American Farmer

From this conception of a farm our best definition is that the farmer, they call him *estanciero*—es-stan-see-air-o, is a real wholesaler and not a retail farmer as we know him in the United States. One farmer may rent from 100 to 200 acres of land to perhaps each of 100 or 200 small farmers whom for convenience are called colonists. These small farmers do the work and the big wholesale farmer gets the profit. As a result of this landed-property system there is throughout the Argentine a great many hugely-wealthy farmers. You might as well learn to pronounce the word *estanciero*. These men can afford 3- and 5-ton trucks and some of them already own such vehicles. One of the largest *estancieros* told me a few weeks ago that the American truck which he purchased some months ago had already more than paid for itself and that he was going to place some repeat orders. This will merely serve to suggest a possible market in the country with a class of people not known in the United States. These *estancieros* are so wealthy that previous to the war they went to Paris nearly every winter and those who do not go to Europe generally have city houses in B. A. A few of the fine residential mansions in B. A. are owned by *estancieros*. They are great stock fanciers and many of them are good business men. Not a few of them have business offices in B. A., where they run their businesses just as a factory in the United States may have its selling office in New York, Chicago or Atlanta. There are many thousands of these wealthy people. They are to be found in Argentina and also in Uruguay, a smaller country which has a good but very limited market.

Chile and Its Minerals

Looking next to the country of Chile. We did not have an opportunity of visiting this interesting little country as it is now winter there and the one railroad between here and Santiago, which has to cross the Andes mountains at an altitude of over 14,000 feet, has only one train a week and this service may stop any day because of the snow on the mountains. Chile, although just a narrow strip of color on the map as you remember it, is in reality a narrow tongue of land between the Andes and the Pacific. This strip is longer than from New York to San Francisco, so here again you may find it necessary to revise your conception of South America. The northern part of this strip is one that appeals especially to the motor truck maker, because in it are located huge nitrate fields whose area is larger than from New York to Buffalo and several hundred miles in width. This nitrate has to be transported from where it is blasted from the surface to the factories, where it is pulverized and boiled and finally allowed to cool into crystal form. There are some American motor trucks already in this work. Where trucks are not used narrow-gage railroads are laid. Experience has already proved that it is cheaper and quicker to build roads through these nitrate fields for motor trucks than to lay rails for the narrow-gage lines. Here, too, we have an area deserving of careful attention.

Space will not permit us to go further into the possibilities of using motor trucks in Chile, in Peru, in Bolivia, Uruguay and in other South American countries. Conditions in these countries will be described in later articles.

The Why of the Big Cart

Before ending this first article a word of explanation is needed with regard to the huge cart shown on the opening page, and also with reference to the other cart illustrations. South America is the land of carts. The two-wheeled vehicle is ten times more common than the four-wheeled type. The huge cart shown on the first page is not the only one of its kind. There are thousands of them and they are in use all over the country at present. The large farmers use them. The two oxen in the picture are only for a size comparison. It takes as many as thirty horses to handle some of these carts when they are loaded with 8 to 12 tons of wheat or corn. I saw many of them on the country roads when I was making trips through the interior on the railroad. One would see four or five in a row, moving scarcely 2 miles per hour. All were loaded high with sacks of grain and the horses seemed literally to fill the road. You could not use such carts as these on our roads because the latter are not wide enough to accommodate the horses, for the reason that in Argentina they do not hitch the horses two abreast, but as many as seven and sometimes eight side by side. Naturally the roads are very wide; in fact, we saw one road several hundred miles inland which looked nearly as wide as a small field in Illinois.

Good Roads? . . . a Jest

In some sections these monster carts have wheels 12 ft. in diameter and 8 ft. in other sections. They are terrifically hard on roads and in wet weather when they get stuck on a soft road the farmer literally starts digging the cart out and a hole remains, similar to what we might expect from a huge shell in the war zone. Here there is bound to be a great field for the sale of American motor trucks. True, roads have to be built in the Argentine, but demonstrate that the motor truck is superior to these huge carts and a good-road building spirit will soon be built up.

Argentine and Brazilian cities abound with carts, but they are much smaller. Buenos Aires is essentially a cart city, the carts being like those used in the country except that they have 60-in. treads and are drawn by two or four horses. The wheels are not as large as those used in the country because the streets are good and the small wheel does as well as the large one. The 12-ft. wheel is an essential in many sections of the country in order that the axle will not always be trailing through the mud. With a 5-ft. clearance you surely can get over bad roads in the country, but it is not an uncommon sight to see these carts abandoned in the middle of a road, the farmer waiting for dry weather.

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The Machias mill in the Washington woods, loading yellow fir logs on 4-ton Riker with trailer. Note road

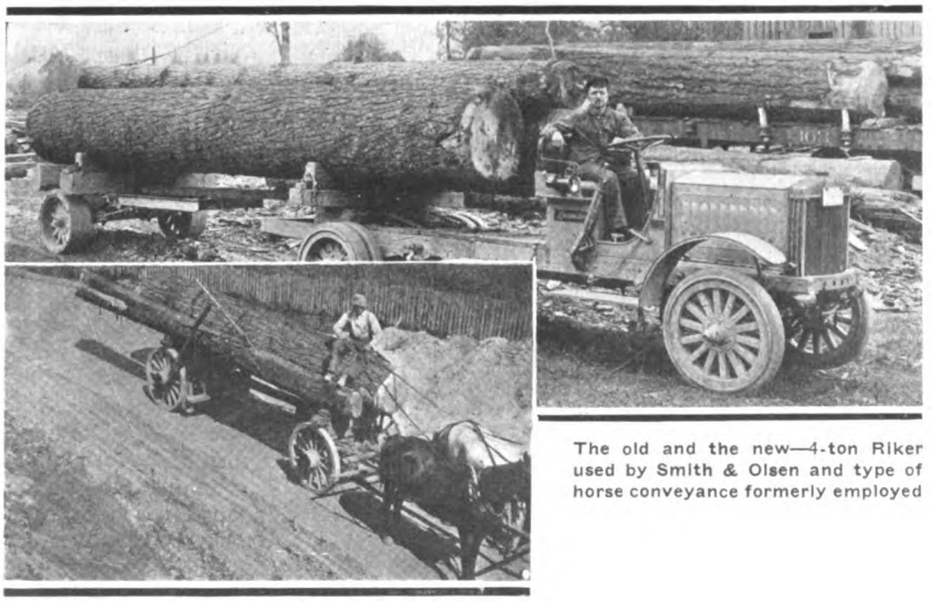
Trucks Oust Horses in Logging Work

Strenuous Service in Roadless Forests Under Heavy Burden Reveals Great Endurance and Reliability of Vehicles

IN the logging country of King County, Washington, around Woodinville and Redmond, there is something like 250,000,000 ft. of lumber ready for cutting. In this section the Machias Mill Co. is working near Woodinville, which is approximately 15 miles from Seattle, located on the Machias River and also on the Northern Pacific Railroad.

This is a comparatively small mill, cutting anywhere from 80,000 to 100,000 ft. of lumber a day, practically all of this being yellow fir. In size, the logs measure anywhere from 16 in. to 6 ft. in diameter at the butt, while the top runs from 14 in. to 5 ft. These sizes of logs are being cut in 20-, 22-, 26-, 30-, 40- and 42-ft. lengths.

To haul these enormous logs on the Riker truck owned by this company, a trailer was built to the company's order by a Seattle firm, this consisting of a heavy metal frame-work mounted on a pair of regular Riker truck wheels and having the regular rubber tires and the same bearings as the rear wheels of the truck. The trailer is connected with the truck by means of a round reach rod, which has a spring connection at the front and a variable connection at the rear.



The old and the new—4-ton Riker used by Smith & Olsen and type of horse conveyance formerly employed

On top of both the truck and the trailer are what is called a bunk. This is a kind of heavy wooden support for the log and is arranged with a clip at either side so that the logs are held from rolling off. When it is desired to dump the logs, these clips can be released.

By means of the reach the length is adjusted so that approximately one-third of the weight is carried on the truck and two-thirds on the trailer. In this way it is possible to carry loads up to 12 tons total weight, although the truck chassis is rated at but 4 tons.

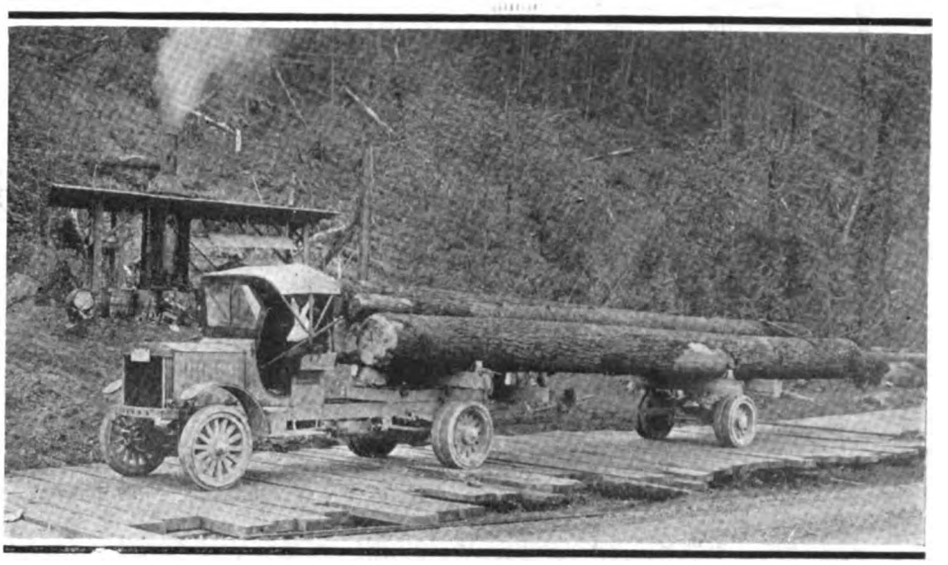
The average load runs about 2600 ft. board measure, although the one shown in the illustration carried almost 3000 ft. board measure. These figures, of course, are taken from the size of the small end of the log and represent the number of board feet which can be cut from the log, not the actual number of board feet in it. Neither is the bark nor the larger end figured in.

With this truck the timber is hauled

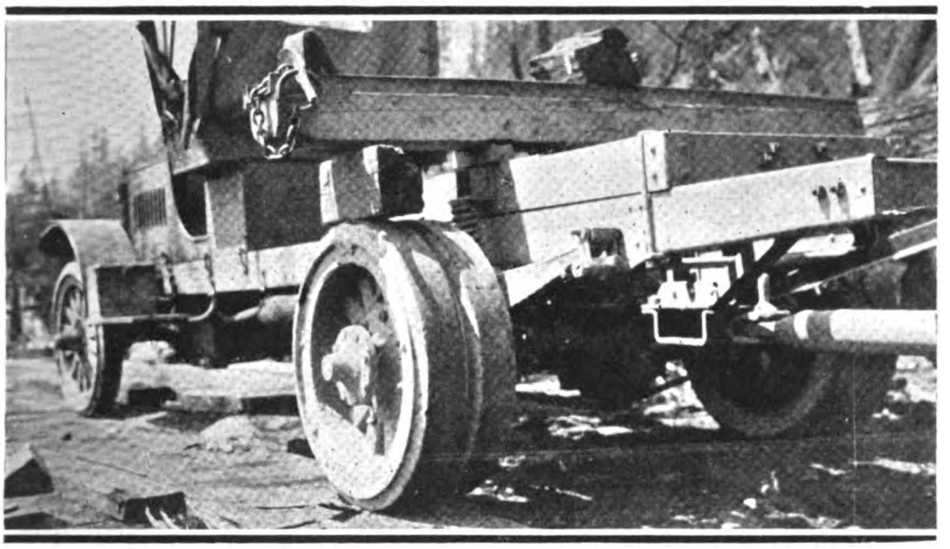
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from the woods over a made road the first part of the way, and then along a dirt road, and again onto a made road at Lake Sammamish. Here it is dumped into the water and hauled by tug boat through the lake into the Machias River and to the Machias mill. After cutting, the lumber is shipped to all points in the Northwest by railroad.

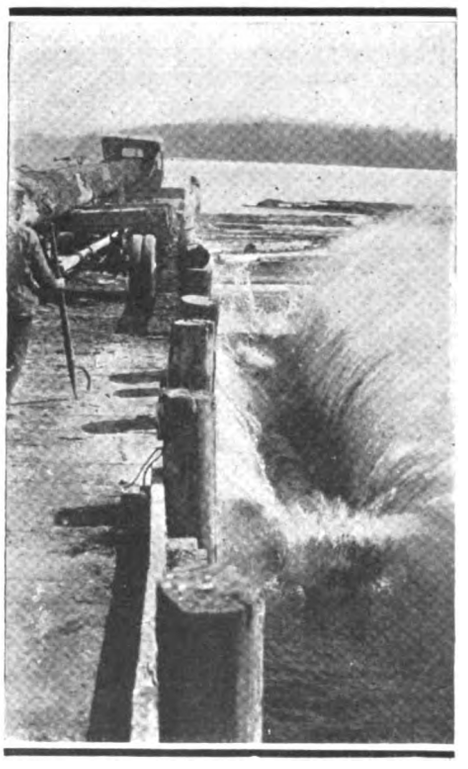
The distance is 7½ miles, making the round trip 15 miles. On the average the truck makes six round trips with 2500 ft. as the load. However, they have gotten out 15,680 in 1 day. It is not practical to use teams on such a long haul, and with such heavy loads, so that the Machias company is now getting out the timber which is not accessible by either rail or water and which could not be logged profitably without the use of the truck, or, in fact, in any other way.



Machias Mill Co.'s truck with a load of 2,988 board ft. of timber, weighing approximately 12 tons



Sub-frame and patented bunk on 4-ton Riker shown above, showing railway car draw-head connection for trailer, used by Machias Mill Co.



Unloading logs into Lake Sammamish. The logs are rolled from the truck into the water

Despite the poor surface over which the truck is running continuously, including roads made from heavy boards with sharp edges, and the poorest kind of dirt roads, also the tremendous loads which are being carried, the truck has shown up very well. At a little over 3000 miles the front tires had not yet begun to show wear; the rear tires looked as though they would just about go the guaranteed distance, while the tires on the trailer looked as though they might go 8000 miles or a little better. This is rather unusual, considering that the trailer loads have been more than double the truck load. The driver estimates the gasoline at approximately 4 miles per gallon, unusually high for the work done. The Machias truck is doing about 200 miles to the gallon of lubricating oil, although this also is a driver's estimate, no particularly accurate record being kept of these items.

Another truck which is doing excellent service for loggers is that operated by Smith & Olson. This company is now cutting yellow fir timber in the neighborhood of Redmond, King County, Washington. After cutting, the logs are hauled by a Riker truck to railroad siding, where they are loaded on logging cars and shipped to another company, which operates a sawmill. This truck operates under very unusual conditions, also, the length of haul being only 1 1/10 miles, or 2 1/5 to the round trip. This includes one very long and very steep hill, which always gave trouble with horses.

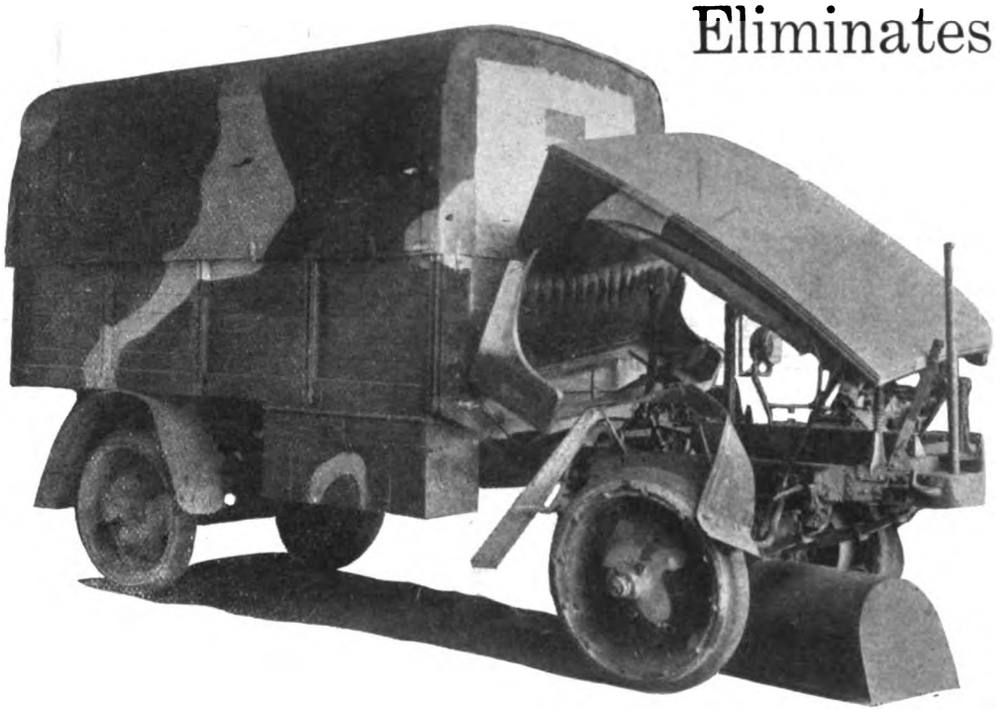
Formerly this company employed a number of four-horse teams, these making approximately five trips a day when conditions were favorable and hauling not more than 2000 board feet per load. In this same work the truck averages twenty trips a day and has done twenty-one and twenty-two, hauling an average of 40,000 board feet, and has hauled over 42,000. In this work it is replacing four of the four-horse teams and requires only one driver, therefore replacing three teamsters. The trailer used in this instance is the back portion of an old Mack truck which was sawed in two in the middle, the driving sprockets and chains removed, the springs reinforced, steel tires put on the wheels in place of rubber and a bunk put on top of the framework for the logs to ride upon.

The average log hauled is about 30 ft. long and measures 4 ft. in diameter at the butt and about 35 in. at the top, although these logs vary all the way from 3 ft. to 6 ft. in their largest diameter. The average load is about 2200 ft.

The driver on this Smith & Olson truck also estimated his gasoline at 4 miles per gallon and claimed to be doing 400 miles to the gallon of lubricating oil. No figures are available as to the tires in this instance.

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Truck Repair System of French Army Eliminates Junk Heap



One of the cripples of the French motor transport, a Jeffery Quad maimed by accurate German gunfire, in the shop behind the lines awaiting the fitting of a new motor. Note the truck's war paint—the splotches of different colored paint on body, top, cab and wheels, to render the vehicle indistinct at long range

A careful Study of Methods Used Should Aid in Reducing the Repairwork Cost on Trucks Employed in Commercial Service

By W. F. Bradley

JUNK HEAPS of motor trucks and motor truck parts have been abolished by the motor vehicle repair branch of the French army. It has not done away with the melting pot, but it has made it impossible for any truck part to get into the pot while it is fit for better service. This has been accomplished by the working out of a most thorough system, described on this and the following pages.

This system is one which should be carefully studied by those officers of our army who are in charge of the several thousand motor trucks now seeing service on the Mexican border. It should also be studied thoroughly by the owners and operators of large fleets of trucks engaged in every-day commercial pursuits. Such study should enable them to apply similar methods in the repair of their own fleets to reduce the cost of repair work.



This looks like a hopeless junk heap, does it not? But it is not, for every unit seen has been thoroughly examined by the special corps of truck experts and passed upon as fit for further service after cleaning and a few repairs

No matter how thorough has been the preparedness scheme of a nation, a vast amount of machinery can only be put into operation after the war dogs have been let loose. This applies particularly to the motor vehicle section of the army and to that portion concerned with repairs. It is not enough to build and purchase trucks and passenger cars—more, and still more. If a nation is going to come out on top it must take care of the motor vehicle material it possesses and not allow the half-wrecked material to find its way to the junk heap and the melting pot.

No Vehicles Reach Speculators

The French army has developed its repair service so thoroughly that it has abolished the junk heap. Also, it has prevented any wrecked or half-worn battle vehicles from getting on the private market or into the hands of speculators. The army has a cleaning-up department which cleans up so effectively and so economically that there is not even a bolt for the men who normally revel in old iron.

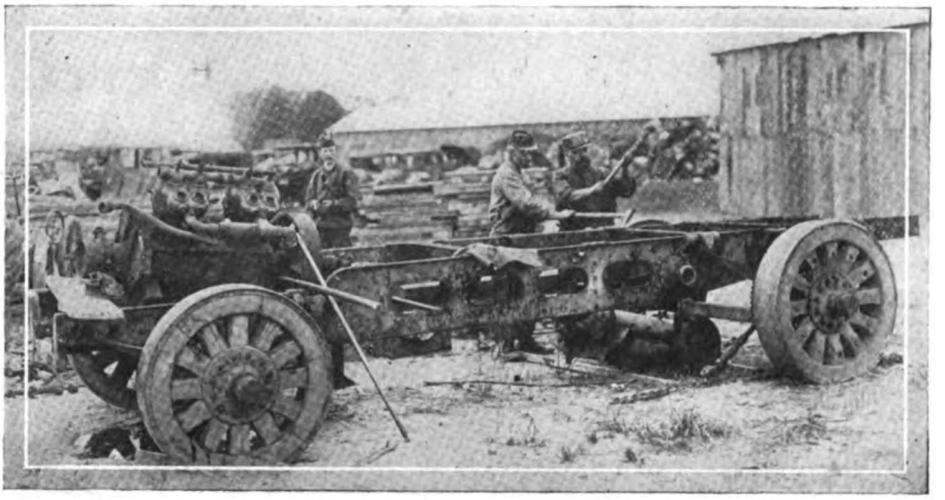
With the convoys at the front and immediately to the rear of the vast armies, there are numerous mobile or semi-mobile

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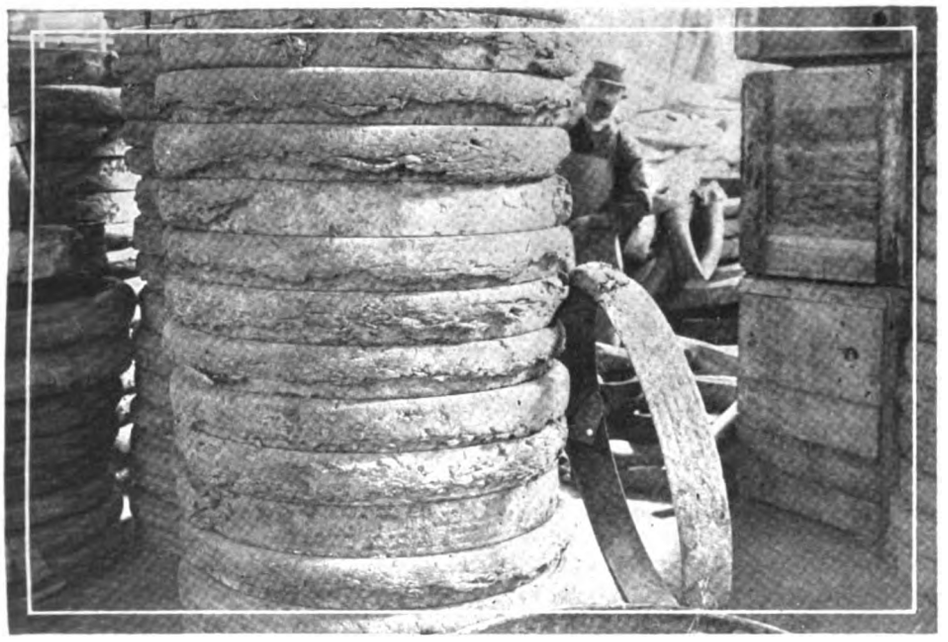
motor vehicle repair shops capable of handling all running repairs and much that is of a more elaborate nature. But it is inevitable, under war conditions, that there shall accumulate quantities of motor vehicles which cannot be repaired by the units at the front or, at any rate, could only be put into condition at the expense of more valuable vehicles.

Central Clearing House in Interior

In order to handle this overflow from the front, this mass of wreckage which, unless controlled, would assume gigantic proportions, the French army repair service has established a central clearing house and repair depot at a point in the interior. Everything which cannot be repaired at the front, every piece of roadside wreckage of what was once a motor vehicle, is placed on the train and dumped into the grounds of the central repair establishment.



Men of the hammer-and-chisel gang at work on an orphan truck which has been condemned as unfit for further army service. Note the steel-shod wheels at both front and rear



Stacks of truck tires which have seen hard service at the front. Not a single bit of rubber is wasted. Machines are available at the interior bases for paring the last particle of rubber off the metal bases

Weaklings Soon Eliminated

In the few months which intervened between the beginning of the war and the opening of this department motor vehicle wreckage had assumed big proportions. When the need for mechanical transportation was felt everything on wheels was commandeered and thrust into army service. Among these hastily recruited vehicles were many only just capable of carrying out a service under peace conditions and condemned to a speedy withdrawal under the rough and tumble of war. Every week, every day, a certain number of weaklings were thrown out, until the central depot has got what might have been mistaken for a monopoly of the motor vehicle junk of Europe. Now all the worst cases have been received, but there is still a steady flow of war-battered trucks of all makes and all types.

Trucks Registered by Card Index

As these wreckages come in they are examined by a group of expert officers and every vehicle is numbered, registered and enrolled under a card-index scheme. If it is a modern vehicle, somewhat worn or slightly damaged by shell fire, the case is simple: it is merely passed along to the repair shop, and a few days or a few weeks later comes back fit for more active service. A more delicate matter is to decide what shall be done with the more desperate cases and with the orphans. For such cases the French officers have adopted a dissecting plan under which only a small part of the most damaged truck finds its way to the melting pot. Each component taken out of a condemned chassis is marked with the registered number of that chassis and sent to the reviewing shop for cleaning and examination. Sometimes a complete engine can be saved; sometimes only a



Hundreds of radiators of all makes and types, some of which will be repaired and some that will be the subjects of the hammer-and-chisel gang because they have not rendered satisfactory service

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Even captured German trucks are put into service by the French. The Mercedes-Daimler shown above was taken by the French in the battle of the Marne and after receiving a new radiator went to work carrying material for the troops of the Republic

crankshaft, or a set of connecting rods, or a pair of cylinders; but whatever the parts picked out as fit for future service, they are entered on the back of the card given to that vehicle when it came in. By classifying these cards according to make, year and model it is an easy matter, when spares are required for any given vehicle, to turn up the cards devoted to cars of that make and model in order to immediately discover whether the parts required are available or not.

Repair Parts from Damaged Vehicles

It is one of the rules that, as far as possible, trucks shall be repaired with parts taken out of other similar vehicles. Applying this scheme on a big scale, it is not too much trouble to take a couple of connecting rods out of an engine which is altogether useless in other respects. It may happen that the next day a similar truck will come in requiring those two rods and nothing more. Not a small number of orphan trucks have been brought into the army; also in many cases the factories are so busy on other work that they have not been able to maintain their stock of spares and could not supply required parts if requested to do so. Thus the accumulation of spares taken from dissected vehicles avoids making parts specially. It is estimated that by the adoption of this system the army economizes not less than $5,000 daily on its spare parts bill.

After taking out the parts which can be used again without any alteration, the dissection of the chassis is continued, the different grades of steel being separated, the aluminum being separated from the brass and the brass from the copper; with a chisel and hammer rivets are knocked out of the frame members and finally the frames are sawn up. But the accumulated metal, fit only for the melting pot, is not allowed to get on the market or fall into the hands of speculators. Every ounce of it is sold to foundries working for the army, so that eventually metal which has been to the front in the form of a motor vehicle returns there in the shape of a shell.

Various Uses of Truck Parts

Wonderfully economical uses have been found for the various parts of trucks. The rear axles of chain-driven trucks, for instance, are commonly employed for carrying field kitchens, for which work they are equal to, if not better than, specially constructed bogeys. The horsehair and leather taken out of passenger cars can be used in making seats for trucks and ambulances. Much of the wood taken out of old hotel buses can be used for making temporary sheds and offices.

One Large Central Repair Depot

Attached to the dissecting department, but constituting a self-contained establishment, is the central repair shop. It differs from other repair shops first by its size, also by the variety of its work, for it has to handle practically every known make of truck, passenger car or motorcycle; also by the fact that everything in connection with it had to be brought into existence at a moment's notice. The authorities discovered a building and yard originally laid out for a wholesale wine merchant's business, lack-



Troy trailers which have seen considerable hard service with the artillery, back at one of the interior bases for repairs. Note the large brakes fitted on both sets of wheels and the special gun trunnion blocks mounted on the bodies

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One of the shops in the interior of France where the various truck units are cleaned, examined, repaired and re-assembled and then put back into the stores for further use. Each part is marked with a tag stating the make of vehicle from which the part was taken, the truck number and model and date of manufacture. In this manner, spare parts for trucks damaged later are easily found

ing power, artificial light and tools. In a few weeks the miracle had been performed of equipping this empty building for the complete repair of every kind of motor vehicle. In the yard awaiting their turn are huge French four-wheel-driven artillery tractors, with a Knox as a companion and a number of Jeffery Quads, looking slender in comparison, forming a background. There are all kinds of trucks, officers' limousines to which death has been a visitor, delicate little cyclecars and motorcycles with spokeless wheels.

Repair Work Subdivided

The variety of the work handled has made it necessary to subdivide more than usual. Thus, in addition to the respective shops for motors, gearboxes, axles, the soldier-mechanics are divided as far as possible into gangs according to their knowledge. Thus, for the Knight motors there are men who have been in the Panhard shops; American trucks are repaired by men who have had some experience with these makes. In the case of complete overhauls the stripped chassis go to a dismounting shop at one end of the building, from which the different units are distributed to specialists. After assembly the chassis pass along to the test shop, each vehicle being sent on the road in the hands of a man who probably had been doing this same work as a civilian for years before the war broke out. Although all the men are soldiers and everything is run on military lines, the skilled workers have been recruited for the most part from the motor vehicle shops of France and include many having had life-long training in that work.

Every Bit of Rubber Saved

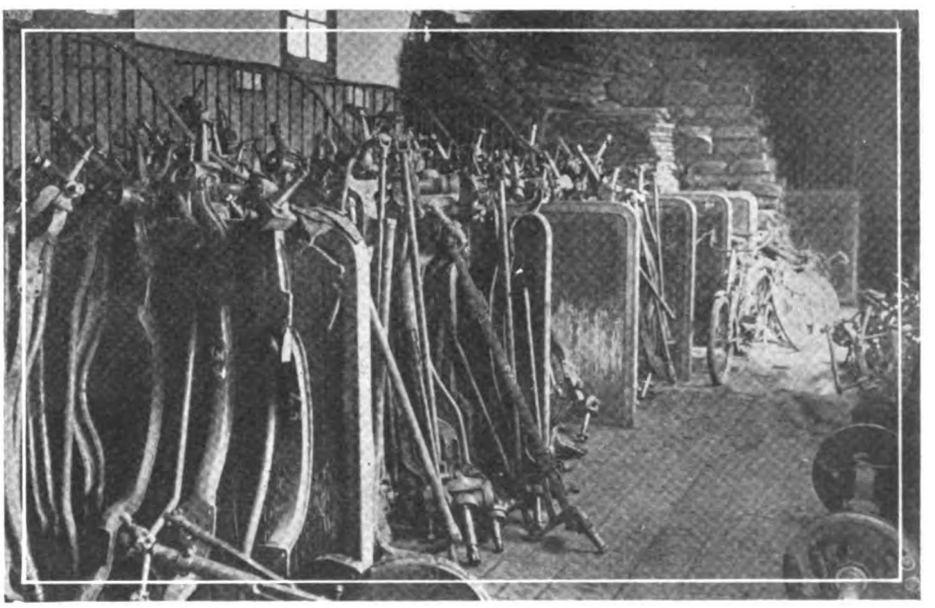
Even tires are included in this general repair scheme. As hydraulic presses are provided for all the repair depots at the front, no truck is ever sent to the rear merely for a new set of tires. But when this has to be done at the same time as other work it can be undertaken, for the central repair establishment is also provided with hydraulic presses. All the discarded solid rubber tires are shipped from the forward repair depots to this establishment at the rear, where machinery is available for paring the worn rubber from the metal bases. Provision has also been made for pneumatic tires, all defective and punctured tubes and casings being returned to the central depot, where several hundreds are repaired and put into the stores each day, ready to be given out to the convoys or depots at the front as required. It has been possible by the establishment of this department to obtain a substantial saving, for there is now no excuse for abandoning punctured tires by the roadside, as was frequently done in the early stages of the war.

Many Vehicles Withdrawn from Service

It is probable that during the first 6 months of the war more old vehicles were withdrawn from service than in the 6 years previous. The war has tended to modernize the motor vehicle fleet of France, and this rejuvenation is continuing. But, thanks to the wonderful organization, this change has been made on the most economical lines possible. Of the vehicles turned out of the army for important repairs, at least 60 per cent go back to service; and out of the 40 per cent classed as unfit, important stocks of spares are secured.

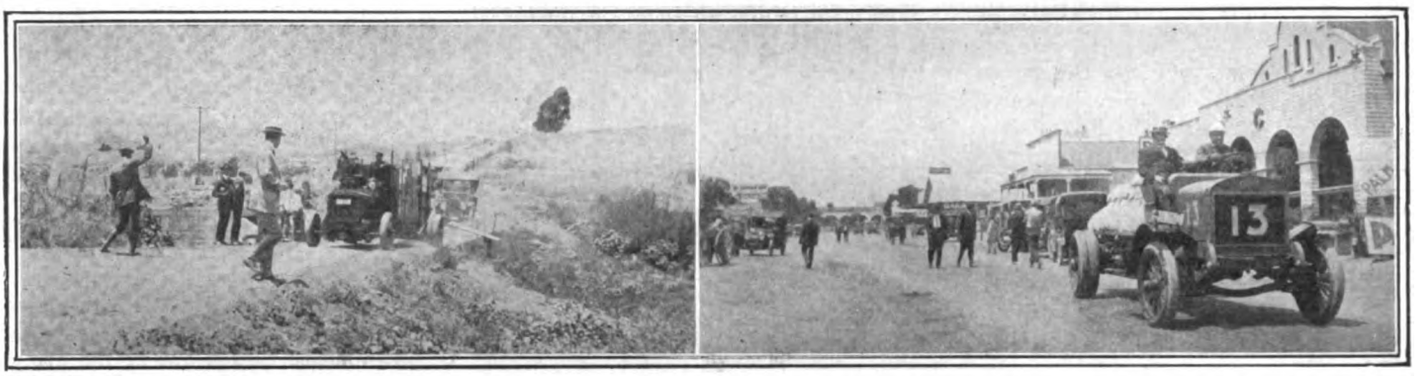
This thorough truck-repair system proved of the greatest value to the French during the first stages of the defense of Verdun, when all the supplies of ammunition and food and new levies of troops had to be transported entirely by motor trucks.

On the 90-mile stretch of road leading into Verdun from Bar-le-Duc, more than 50,000 trucks were employed continuously for more than 6 weeks, day and night. These vehicles formed an unbroken line of traffic in which the trucks were spaced an average distance of 110 yd. apart. It was absolutely essential that the road should never be blocked. If a truck broke down it was pulled to the side of the road so as not to interfere with traffic and an empty vehicle was sent out to take its load. The disabled truck was then towed back to the repair base at Bar-le-Duc by the breakdown gang. There it was delivered to specialists, who examined it carefully and prescribed for it as a doctor does for a patient. Special gangs of men held in readiness were set to repairing it.



A fine stock of axles taken from dismembered trucks. Every axle has been registered for easy identification when required for replacements on other trucks. Note that the storehouse is an old horse stable in which the stalls have not been removed

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Scenes by the way—Left, the Doane low-bed truck, San Francisco-made, crossing a frail bridge with 6 tons. Right, trucks checking in at first day's noon control, San Juan Capistrano, Cal.

Eleven Perfect Scores in Truck Run

Only Three Below Par in 136-mile California Reliability

EXPOSITION Grounds, San Diego, Cal., July 15—Of fourteen trucks which started in the Panama-California Exposition commercial vehicle run from Los Angeles yesterday, eleven finished here to-day with perfect scores. The success of the run was a disappointment to many, as they had expected many penalties on the 136-mile drive, and when all but three of the entrants came through without any demerits, they were dissatisfied.

The three which were penalized were guilty of only minor troubles. The vehicles ranged in capacity from 1,000 lb. to 12,000 lb., the roads from boulevards to no road at all, the grades from zero to real mountain going. The entire run could have been made in 1 day, according to the A. A. A. schedule.

Followed Old Mission Road

The trucks left Los Angeles at 8 a. m., following *El Camino Real* through Fullerton, Anaheim, Santa Ana, San Juan Capistrano, Oceanside, Del Mar and La Jolla to San Diego. San Juan Capistrano, in the shadow of the ancient mission, was the noon stop.

The first incident occurred just before reaching San Juan, when O. V. Burris in a G. M. C. 1500-pounder broke a gasoline line. This happened twice on the run and he also had a punctured tire, so that his score was 938 at the end of the run, the lowest of any.

Detour Does Not Deter

A 2-hours' run brought the party to Oceanside, where after a dip in the surf, the night stop was made at Hotel San Luis Rey.

Between Oceanside and Del Mar, on the next day's run there is a sandy detour around a bridge over the Escondido River, which has been washed out. All of the trucks, even the Doane, the heaviest of the lot, went through without difficulty, the Doane not even changing a gear.

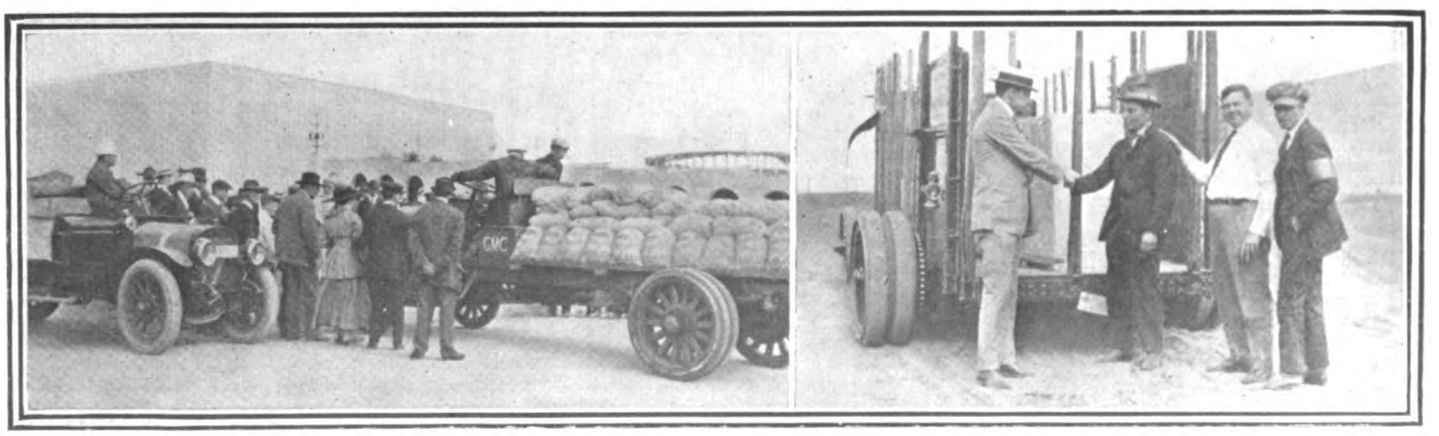
The Doane was loaded with a block of stone weighing 12,000 lb. It is a San Francisco product, characterized by its low frame and load-platform.

At the end of the run, clutch and brake tests were conducted in accordance with A. A. A. rules, and upon the completion of these the Doane and the 3½-ton G. M. C. were cheered loudly by the onlookers, quite after the manner in which victorious speed merchants are cheered.

The Conquering Heroes

Following are the trucks, their drivers and the weight of the loads carried:

Truck and Driver	Load Carried
Vim, Krapp	1,100
Vim, Kirkpatrick	1,100
Vim, Lloyd	1,200
Doane, Miller	12,000
Stewart, Fouch	1,030
Studebaker, Futley	1,090
Studebaker, Fortine	2,121
Smith Form A Truck, Meisel	2,090
G. M. C., Hurd	7,400
Denby, H. G. Pendell	3,010
Little Giant, Darin	1,590
Little Giant, Johnson	3,130
Autocar, Heffner	3,150
G. M. C., Burris	1,670



At destination—Left, clutch and brake tests at the Panama-California exposition. Right, Manager Fred Pabst and Checker Lille congratulating F. B. Miller on the successful run of the Doane Daschund truck with a 12,000-lb. block of stone

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SEWELL SALES INCREASE 300 PER CENT

DETROIT, MICH., July 20—The Sewell Cushion Wheel Co., this city, shows an increase in business for the first quarter of its fiscal year of 300 per cent over the same period last year.

Plans are now being formulated for establishing service stations, in connection with the branches in Buffalo, Boston, New York City, Philadelphia, Baltimore, Minneapolis, Rochester, Cleveland, St. Louis, Pittsburgh, Los Angeles, Seattle, and Chicago. A service station is maintained at the factory for the benefit of Detroit users.

OVERLAND GOTHAM BRANCH OPEN

NEW YORK CITY, July 17—The Willys-Overland Co., has opened a direct factory branch in this city for the direct sale of Overland cars and trucks. This action on the part of the Overland organization follows out the policy already put in force, of establishing its own branches in the most important cities in this country.

C. T. Silver, who formerly handled the Overland products, has just closed a $6,250,000 contract with the Chalmers Motor Co., Detroit, to handle its car in this territory after Aug. 1, thus leaving the commercial field.

E. B. Jackson, formerly president of the Packard Motor Car Co., this city, has recently become associated with the Willys-Overland Co. at Toledo in an executive capacity. He will make use of his experience and knowledge of metropolitan needs by devoting a large part of his time to the creation and development of an organization in this territory.

The company has had in progress the erection of one of the largest service buildings in this territory with a view to taking over its own business. Conditions over which the company had no control suddenly presented themselves on Friday and steps were immediately taken to establish a branch by locating a temporary showroom at 1826 and 1828 Broadday, and also the establishing and equipping of a service station at 150th Street and Girard Avenue, the Bronx, in a building of 60,000 ft. floorspace. It is the intention of the company to open immediately sales and service stations in Brooklyn and Newark.

The new building which is in process of completion is located on Fifty-seventh and Fifty-eighth Streets, between Tenth and Eleventh Avenues. This building is partially completed at the present time and when finished will have a floorspace of 300,000 sq. ft. and will represent an investment of about $1,000,000.



Extra! One way to beat the German censor—by the Kaiser's super-submarine, the Deutschland. *The illustration shown above reached this country on the giant U-boat which has threatened to dispute Britannia's rule of the sea. It depicts a portion of the central repairshop of the German motor transport at Gempelhof, near Berlin. From the evident condition of the trucks and passenger cars shown, it would appear that the Kaiser's motor vehicle toll has been heavy. The picture is one of the very few that have found their way out of the territory of the Central Empires since the beginning of the war*

DIVIDENDS DECLARED

TOLEDO, OHIO, July 13—The directors of the Willys-Overland Co. yesterday declared a regular quarterly dividend of 3 per cent in cash, placing the regular dividend on a 12 per cent per annum basis.

The directors also declared an extra stock dividend of 10 per cent.

The cash dividend is payable Aug. 1 to holders of record July 24. One-half of the 10 per cent stock dividend is payable Oct. 2 to holders of record Sept. 15. The remainder is payable April 2 to holders of record March 15.

DETROIT, July 18—The Bower Roller Bearing Co., at its directors' meeting, held here July 11, declared a 15 per cent cash dividend as the regular quarterly dividend.

Kelly-Springfield Tire Co., quarterly of 4 per cent on common, payable Aug. 1, to stockholders of record at the close of business July 17.

South America's Truck Market

(*Continued from page* 10)

must send one of his best men to South America. If he wants to do real business he should know Spanish. If he hopes to do real work in Brazil he must know Portuguese. If Spanish is understood, the Portuguese will readily follow. It is impossible to do business satisfactorily with these natives unless in Spanish. There are many dealers who speak English, but they all do not, and if one wants to demonstrate his truck to the native businessman, it is imperative that he shall know Spanish or Portuguese according to what country in which he is doing business. All of South America is Spanish except Brazil.

It is a mistake to send many of the so-called salesmen who may apply for the job and offer as their main asset that they speak Spanish or Portuguese fluently and that they are even familiar with the slang expressions in the different tongues. Too many of such salesmen are only first-order takers. Often they carry a dozen different lines with them and do not know enough about any one to be a really adequate representative. Everywhere in South America you hear of this kind of salesman and the South American businessman is heartily disgusted with him. Select your man. He must be the best available. He must know Spanish. He must know your goods. He must be reliable. He must be honest and not easily discouraged.

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Compartment Telephone Body and High-class Bus

Former Has Place for Every Tool—Latter Like a Limousine

Compartments in Telephone Body Save Time Finding Tools

SIDE compartments and racks for carrying ladders and pike poles feature a new type of body fitted on each of a fleet of three White motor trucks now in the service of the construction department of the Cleveland Telephone Co., Cleveland, Ohio. The body is designed to carry all of the equipment generally used by a telephone construction gang and provision is made to carry each particular tool or apparatus in a particular place where it is easily accessible to the workmen, thus tending to eliminate the time formerly lost in locating material in the usual type body.

The body is of the semi-box type, approximately 12 ft. long, 4 ft. 6 in. wide in the clear and 3 ft. 6 in. high. As shown in Figs. 1 and 3, a large chest with various shelves and drawers is fitted on each side, both running the entire length of the body and extending out to a line approximately flush with the outside face of the rear wheel. Longitudinal stringers level with the top of the driver's cab are carried above the boxes on both sides on A-shaped metal uprights which are fitted with brackets to carry ladders and pike poles, as shown in the accompanying illustrations. Three wooden cross members are provided to set on top of the longitudinal stringers to support a tarpaulin cover used in rainy or snowy weather.

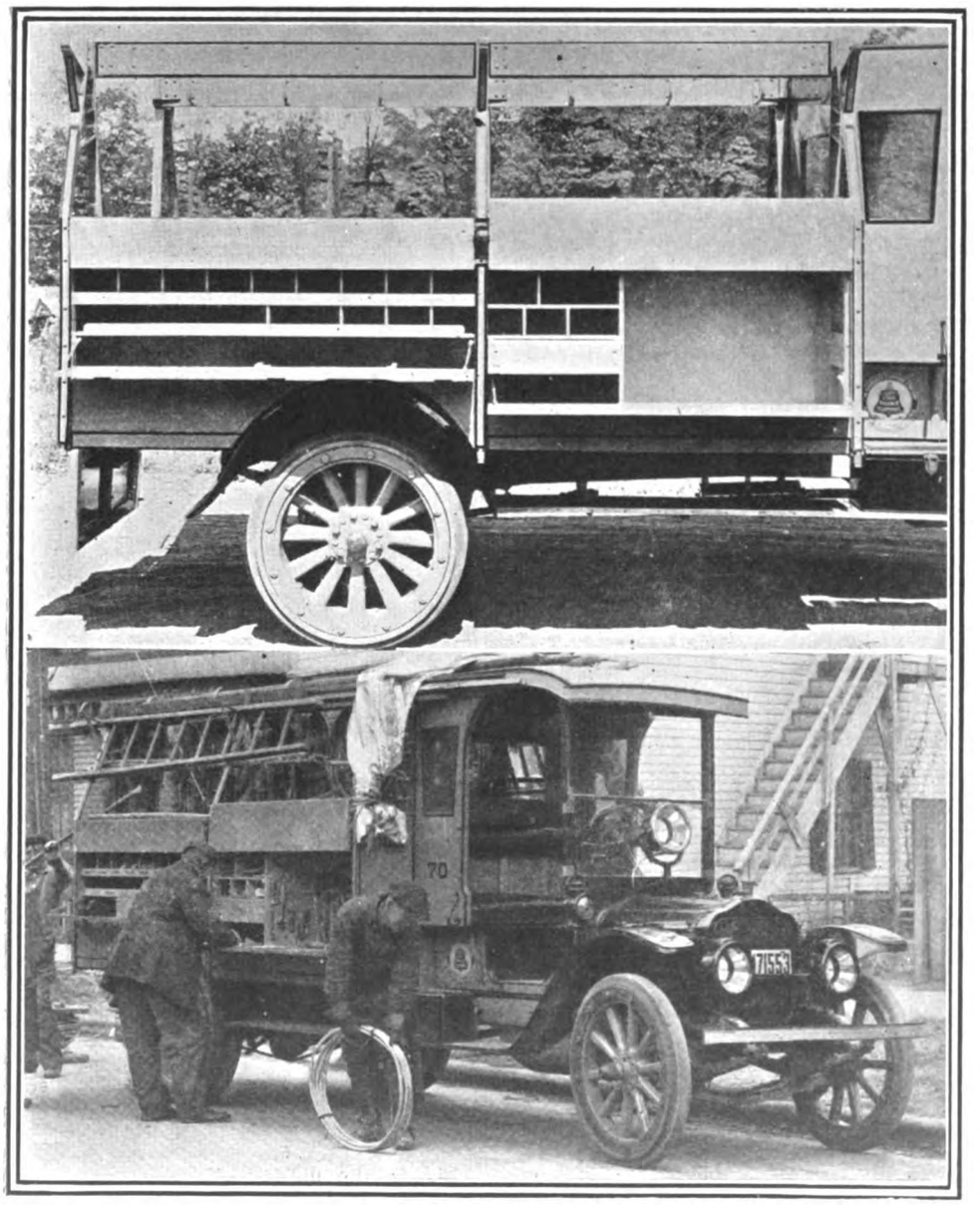


Fig. 1—The type of body used on the White trucks now in the service of the construction department of the Cleveland Telephone Co., Cleveland, Ohio. The view at the top is a close-up of the compartments fitted on each side and the lower picture illustrates how the body is actually used. Note how each particular bin or cupboard is used for a particular group of tools and how ladders are carried on metal hooks on a framework above the side compartments

As shown in the top view of Fig. 1, each side chest is divided into two main vertical compartments, the rearmost one having slightly less cubical contents than the forward one, due to the undercut wheel housing made necessary by the wide body width. Each one of the compartments is further sub-divided into smaller cupboards and drawers, each to carry some particular kind of tool or part needed in the work. A large number of hand tools are required in telephone construction work and by putting each group of tools in a special compartment or drawer, they may be obtained almost instantly by the workman when going to the truck. Thus the time formerly wasted in picking tools out of a large tool-box is practically eliminated and as a result the men are able to do considerably more work in a given time. As shown in the lower view of Fig. 1, tools such as chisels, hammers, etc., are carried in loops of leather nailed to the side of the large compartment in the forward division of the chest. The tools and equipment carried in the chests are protected from the weather or from dirt and dust while the vehicle is *en route* by means of doors hinged to the top and bottom and swinging up at the top and down at the bottom.

The clear space inside the body is used for carrying large pieces of material such as reels of wire and other bulky goods. All except two men of the gang also ride inside of the body during the runs between jobs, the foreman and his assistant generally riding on the front seat with the driver.

Ladders are hung over the brackets on the outside of the A-frames supporting the longitudinal stringers for the top. Additional brackets bolted on the inside of the stringers are used to carry coils of rope, shovels, etc.

Other additional equipment fitted to each of the vehicles to enable the gangs working with them to perform their work in the most efficient manner include a trailer coupling for hauling large reels of wire and a searchlight mounted on top of the motor hood directly in front of the windshield. The latter renders especially efficacious service in winter when the work of the gang is increased and made difficult due to storms and the subsequent downing of the wires. Under these conditions the searchlight's rays may be thrown to the top of a terminal pole or to the bottom of a manhole without changing the position of the truck. The trucks were completely equipped by the White Co., Cleveland, Ohio.

Pretentious Limousine-like Bus for Hotel Service

CHARACTERIZED by its limousine-like body, the trim-looking bus shown in the views of Fig. 2 is one of two mounted on 2-ton Chase chassis used by the Onondaga hotel in Syracuse, N. Y., to carry its patrons to and from the railroad stations in that city. The lines of the body are simple, yet the appearance is dignified due to the large size of the windows, the fine polish of the wood surfaces and the fitting of coach style lamps on the sides.

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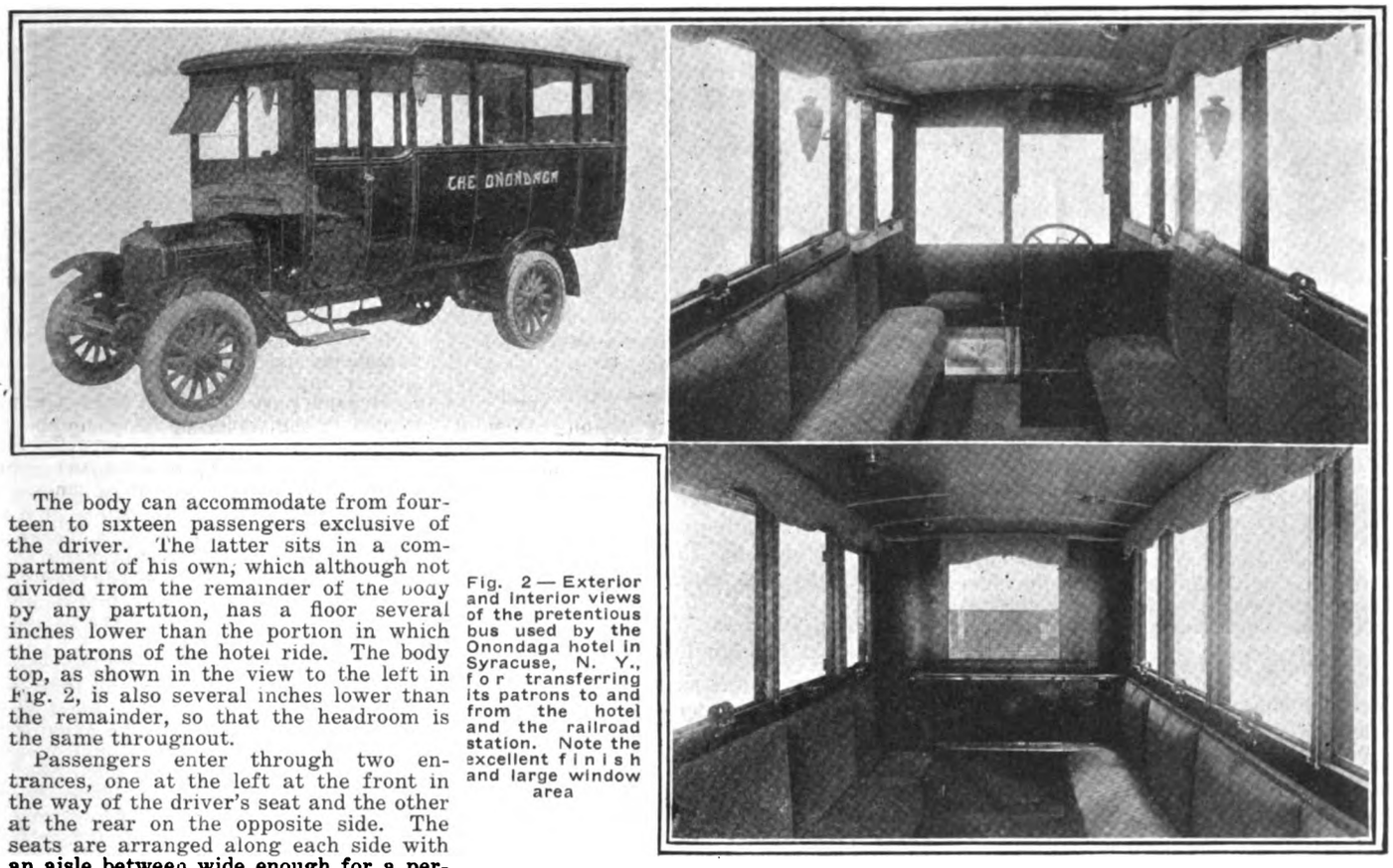


Fig. 2 — Exterior and interior views of the pretentious bus used by the Onondaga hotel in Syracuse, N. Y., for transferring its patrons to and from the hotel and the railroad station. Note the excellent finish and large window area

The body can accommodate from fourteen to sixteen passengers exclusive of the driver. The latter sits in a compartment of his own, which although not divided from the remainder of the body by any partition, has a floor several inches lower than the portion in which the patrons of the hotel ride. The body top, as shown in the view to the left in Fig. 2, is also several inches lower than the remainder, so that the headroom is the same througnout.

Passengers enter through two entrances, one at the left at the front in the way of the driver's seat and the other at the rear on the opposite side. The seats are arranged along each side with an aisle between wide enough for a person to walk down even when all the seats on both sides are occupied. The headroom is approximately 6 ft., thus giving sufficient room for the average passenger to stand full upright from the time he enters until he leaves.

The space beneath the side seats has been left open to enable passengers to deposit their small bags and suitcases beneath the seats they are occupying. Larger luggage is carried on large brass rails fitted on the outside of the body at the rear.

The bus is of the closed type with a clear-vision windshield at the front in the way of the driver's seat and a sash window next it. The windows, which extend the entire length on each side and also across the rear, are larger than fitted in the average bus, taking up approximately one-half the body height. The doors are also fitted with windows, so that the interior is extremely light. The windows are of plate-glass type without sash and may be dropped down into pockets in the bus side in warm weather.

The interior finishing is in keeping with the dignified outside appearance, the upholstery being of plush of a delicate color. Five overhead electric lights in frosted domes staggered in the ceiling as shown in the interior views in Fig. 2, furnish ample light for the interior. All of the interior woodwork trim above the line of the window casing is mahogany with a white ivory ceiling. In cold weather the interior is heated by radiators utilizing the heat of the exhaust gases.

BOOK REVIEWS

"Cost Accounting Theory and Practice," by J. Lee Nicholson, is one of the most practical as well as advanced studies of this most important phase of business activity, so far published. The volume has been issued in its second edition by the Ronald Press Co., New York City. Mr. Nicholson, a certified public accountant and professor of cost accounting at Columbia University, is a recognized authority, having previously published two works which are regarded as standard on this subject.

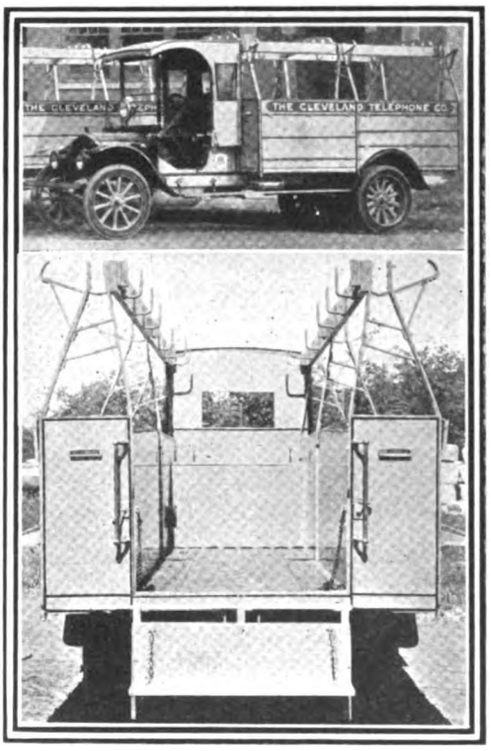


Fig. 3—The telephone body as it looks on the vehicle is shown at the top. The bottom view shows the large carrying space between the side compartments and the construction of the framework to carry ladders, coils of rope and miscellaneous goods

Mr. Nicholson's task has not been easy, in view of the close connection between advanced cost accounting and factory efficiency systems, but he has been successful in presenting the principles of cost accounting and methods used in special cases, without diverting to other related but not essential subjects.

The work is not intended for beginners or novices, but only for practical accountants, economists and executives who are confronted with tangible problems, and who are in search of assistance in solving them.

The book is bound in green cloth with morocco back and corners. It contains 327 pages of matter, not including an index of forms, and over 100 reproductions of forms, charts and outlines. It is 6 by 9 inches in size and sells for $4, postpaid.

"Automobile Starting and Lighting," issued by Frederick J. Drake & Co., Chicago, is a useful treatise on the subject from the pen of Harold P. Manley of a very practical and thorough nature. It contains 294 pages of text and a useful index at the back. A feature is the profuse illustration of the work, there being 128 separate line cuts and halftone engravings. At the back is a glossary of electrical terms that should prove very handy for reference both while reading the book and for general use.

The subject has been treated according to the different units embodied in modern electrical systems in use on motor vehicles, this method permitting all of the different constructions to be treated fully without wasteful and fatiguing repetition. In leather it sells for $1.50; in cloth at $1.00.

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Devoted to topics pertinent to commercial vehicle operation design and maintenance. Open to the use of all readers. Communications must be accompanied by the sender's name and address, confidential if preferred. No charge is ever made for this service.

MISSING PRICES ARE GIVEN

Late Models and Their Cost, Omitted From January Lists

To the Editor, COMMERCIAL VEHICLE:

In checking over a list of motor trucks and their prices, we find that we either lack the prices or are doubtful about the correctness of those which we have in the case of the following machines:—MORRIS A. HALL, advertising department, Locomobile Co., Bridgeport, Conn.

Mr. Hall's list and the prices follow:

Curtis 2-tonner	$2,750
Curtis 3-tonner	3,200
G. V. Mercedes 6-tonner	4,500
Burford 3½-tonner	....
Garford 3½-tonner	3,400
G. M. C. 5-ton, chain-driven	....
G. M. C. 5-ton, worm-driven	....
Horner 2-, 3- and 5-tonners	....
Hurlburt 2-tonner	3,000
Hurlburt 3½-tonner	3,500
Kelly-Springfield 2½-tonner	2,750
Peerless 3-tonner	3,700
Peerless 4-tonner	4,000
Peerless 5-tonner	4,500
Peerless 6-tonner	5,000
Peerless 2-tonner, worm-driven	3,000
G. V. Electric 2-tonner	2,600
G. V. Electric 3½-tonner	3,250
G. V. Electric 5-tonner	3,700

PARTS FOR WAGENHALS MOTOR

Three-wheeler Used Mason Engine and Two Magneto Makes

To the Editor, COMMERCIAL VEHICLE:

We have a Wagenhals parcel delivery truck, the same being made in Detroit, and we wish to purchase a magneto drive gear for this motor. Can you tell me who made the motor for this job or who handles parts?—C. E. GLEASON, purchasing agent, The Detroit Chassis Co., Detroit, Mich.

The Wagenhals is no longer on the market and THE COMMERCIAL VEHICLE must appeal to its readers for information as to where repair parts can be secured. The motor used was the Mason, made by the Mason Motor Co., Flint, Mich.

Two makes of magnetos were used, the older models having the Briggs and the later ones the Splitdorf. Possibly the Splitdorf company might be able to supply a gear.

AMERICAN TRUCK EXPORTERS

Fifty-four Builders Who Sell Vehicles in Foreign Countries

To the Editor, COMMERCIAL VEHICLE:

We are requested by our firm in London, who is interested in the sale of extra parts for motors, to ascertain the names of manufacturers in this country who have exported motor trucks to any extent in Great Britain. We understand that these manufacturers are known to you.—BENJAMIN WHITTAKER, New York City.

As far as is known at the present time the following are the American builders of trucks who have exported trucks to England of recent times:

Acason Motor Truck Co., Detroit, Mich.
Atterbury Motor Truck Co., Buffalo, N. Y.
Baker-R. & L. Co., Cleveland, Ohio.
Bessemer Motor Truck Co., Grove City, Pa.
Brockway Motor Wagon Co., Cortland, N. Y.
H. G. Burford Co., Fremont, Ohio.
Buick Motor Co., Flint, Mich.
Chase Motor Truck Co., Syracuse, N. Y.
Columbia Motor Truck & Trailer Co., Pontiac, Mich.
Denby Motor Truck Co., Detroit, Mich.
Federal Motor Truck Co., Detroit, Mich.
Four Wheel Drive Auto Co., Clintonville, Wis.
Garford Motor Truck Co., Lima, Ohio.
General Motors Truck Co., Pontiac, Mich.
Gramm-Bernstein Co., Lima, Ohio.
General Vehicle Co., Long Island City, N. Y.
Lewis-Hall Iron Wks. Co., Detroit, Mich.
Hurlburt Motor Truck Co., New York City.
Thomas B. Jeffery Co., Kenosha, Wis.
Kelly-Springfield Motor Truck Co., Springfield, Ohio.
Knox Motors Associates, Springfield, Mass.
Krebs Commercial Car Co., Clyde, Ohio.
Chicago Pneumatic Tool Co., Chicago, Ill.
Maccar Co., Scranton, Pa.
International Motor Co., New York City.
Morton Truck & Tractor Co., Harrisburg, Pa.
Willys-Overland Co., Toledo, Ohio.
Packard Motor Car Co., Detroit, Mich.
Peerless Motor Car Co., Cleveland, Ohio.
Pierce-Arrow Motor Car Co., Buffalo, N. Y.
Reo Motor Truck Co., Lansing, Mich.
Republic Motor Truck Co., Alma, Mich.
Locomobile Co. of America, Bridgeport, Conn.
Saxon Motor Co., Detroit, Mich.
G. A. Schacht Motor Truck Co., Cincinnati, Ohio.
Selden Motor Vehicle Co., Rochester, N. Y.
Service Motor Truck Co., Wabash, Ind.
Signal Motor Truck Co., Detroit, Mich.
Standard Motor Truck Co., Detroit, Mich.
Stegeman Motor Car Co., Milwaukee, Wis.
Sterling Motor Truck Co., Milwaukee, Wis.
Studebaker Corp., Detroit, Mich.
United Motors Co., Grand Rapids, Mich.
United States Motor Truck Co., Cincinnati, Ohio.
Velie Motor Vehicle Co., Moline, Ill.
Vim Motor Truck Co., Philadelphia, Pa.
Briggs-Seabury Ordnance Co., Sharon, Pa.
Walter Motor Truck Co., New York City.
White Co., Cleveland, Ohio
Wichita Falls Motor Co., Wichita Falls, Tex.
Ward Motor Vehicle Co., Mount Vernon, N. Y.

HINTS ON VALVE-TIMING

Lag Necessary to Secure Power from the Engine

To the Editor, COMMERCIAL VEHICLE:

Having occasion to overhaul an old motor recently, I disassembled portions of it, including the camshaft and valve operating parts. When I went to reassemble it, I found to my dismay that neither the flywheel or the gears had any marks on them to guide me in re-timing the valves or the magneto.

I was thrown entirely on my own resources and had to improvise the timing as best I might. It seemed to me that somewhere I had heard that the exhaust valve should close and inlet should open simultaneously. It seemed logical that this should take place at upper dead center for each cylinder, so I tried various positions of the gears until I found such a one.

I then started the motor, and while it would idle very nicely, it would stall every time I let in the clutch. In other words, while it would run it seemed to have no power whatever. Even when idling, it seemed to be very slow in picking up speed. As I know every other part to be in perfect order, I am wondering if the valve-timing is not imperfect.

By the way, in timing the magneto I fixed it so that at the extreme retard position the points broke just a shade past upper dead center. This is right, isn't it?—F. C., New Rochelle, N. Y.

Your valve timing is very wrong for the reason that you have not allowed any lag in your timing. By cutting off your exhaust just at dead center you are not scavenging as perfectly as you should and by opening your inlet too early, you have it open before the piston has created any suction in the cylinder and close it before the cylinder has had an opportunity to inhale its full charge. This is accounted for by the fact that with your engine operating at anything more than the slowest speed, the inertia of the gases causes them to flow for a time after the piston has changed its direction and the original cause of their flow has been removed. If this is taken advantage of by having a lag in the timing, more complete scavenging on the exhaust stroke and the intake of a fuller charge on the intake stroke will result.

The amount of lag to be provided depends upon the speed and to a certain extent upon the design of the motor. Some very slow-speed stationary engines are designed with a valve-timing approximately such as you describe, but for

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a motor which exceeds 1,000 r.p.m., it is impossible to secure anything like satisfactory results without considerable lag.

The best way in which to secure correct valve-timing is to consult the builder of the engine, or if this is not possible, then follow the directions below and watch your results. If they are not entirely satisfactory, the gears can be slipped around one tooth either ahead or back until the best position is found.

In timing an engine it is not necessary to concern oneself with the opening of the exhaust valve or the closing of the inlet valve, but only with the closure of the one and the opening of the other.

It is good practice to close the exhaust valve at 6 degrees 40 minutes after bottom dead center and to open the inlet valve at 10 degrees flat. Time one cylinder according to this formula and the others will automatically coincide, if your engine is of the conventional tandem type.

To achieve this result the following procedure is recommended: Find the point on the flywheel which coincides with the center of the crank for the cylinder being timed. Mark this point, if not already marked, with a center punch or a chisel. Use some convenient portion of the engine or chassis as a marker, or attach a pointer so that it will register with the mark on the flywheel at top dead center.

Measure the diameter of the flywheel and multiply by 3.1416 for the circumference. Divide this by 360, which will give the number of inches on the circumference to one degree of rotation. Lay off in inches what corresponds to 6 2/3 deg. from the dead-center mark, and revolve the flywheel in an anti-clockwise direction until this point comes under the pointer. Then move the camshaft until a point is reached at which the exhaust valve for the cylinder being timed has just closed. If there is but one camshaft, this will automatically time the inlet valve; but if there are two, 10 deg. will next have to be laid off on the flywheel, the flywheel turned to this, and the inlet camshaft turned until the inlet valve just starts to open.

The relation of the inlet and exhaust-valve openings to the degrees of flywheel rotation and piston position are shown in Fig. 1.

A more accurate method of retiming the motor, of course, would be to secure from the manufacturer the timing formula for which the motor is designed, the above instructions being given to supply a means of getting your motor into passable working shape. If such a formula is not obtainable because of the impossibility of locating the manufacturer, only experiment with different timing can determine the best setting.

Your setting of the ignition is correct.

IGNITION IN 1916 TRUCKS

97 Per Cent Have Magneto Spark, 3 Per Cent Battery

To the Editor, COMMERCIAL VEHICLE:

What percentage of 1916 commercial vehicles use high-tension magneto ignition? What percentage use the battery-distributor system? What percentage use the electric starting?—J. E. S., New York City.

Of those listed in the specification tables published in THE COMMERCIAL VEHICLE of Jan. 15, 1916, 97 per cent of the models were equipped with magneto ignition, of which 93⅓ per cent were of the high-tension type. Battery ignition was used on 3 per cent of these models. THE COMMERCIAL VEHICLE regrets that it is impossible to give complete information on the users of electric starting on 1916 trucks. This information was not tabulated in the annual specifications, owing to the small number of users at that time. Since then a considerable number of makers have applied electric starting and lighting to their trucks. In the 1917 specification tables this data will be incorporated.

EMERSON TRUCK NOT YET OUT

Metropolitan Motors Dealer Not Builder of Motor Trucks

To the Editor, COMMERCIAL VEHICLE:

Being a reader of your magazine, I would like to trouble you for any information you may be able to offer regarding the Emerson Motor Co. and the Metropolitan Motor Co., recently organized and located on Long Island.—FRED T. KRAMER, New York City.

The Emerson Motor Co. has offices in the Marbridge Building, Sixth Avenue and Thirty-fourth Street, New York City, and a factory in Long Island City. It is at present producing a five-passenger touring car at the phenomenal price of $395. Willis George Emerson is chairman of the board of directors, T. A. Campbell is president, R. C. Hupp vice-president, and George N. Campbell is secretary-treasurer. Between ten and twelve men are employed at the present plant. A production of 500 cars is planned before the end of the year. A commercial model is to be added at some future date.

The Metropolitan Motors Co. is unknown.

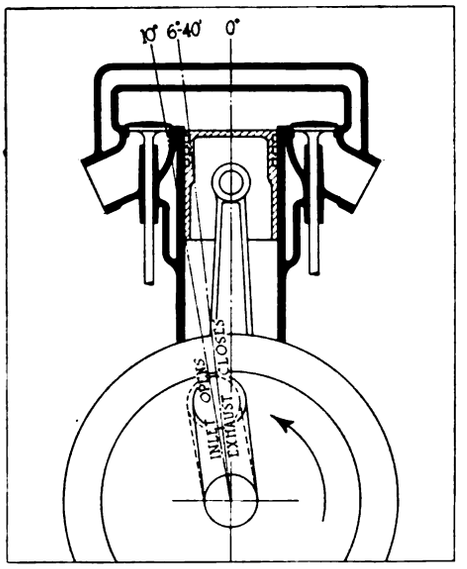


Fig. 1—Showing simple method of timing motor

WOULD STUDY THE DIFFERENTIAL

Contemporary Has Discussed Subject More Exhaustively and in Detail

To the Editor, COMMERCIAL VEHICLE:

I understand that during the past 6 months you have published a number of articles about differentials and especially about improvements in the same. As I am interested in this subject just now, can you give me the dates when these articles were published and advise if you can supply the back numbers?—H. A. LANE, Pittsburgh, Pa.

The only article during the past 6 months appearing in THE COMMERCIAL VEHICLE which goes into this subject deeply appeared on page 30 of the issue of May 1, 1916. No doubt the series of articles which you have in mind are those which have appeared in *The Automobile*, published at 231-241 West Thirty-ninth Street, New York City.

NEW BOOKS

"Electric Lighting and Starting" is the name of a new book by J. Edward Schipper, technical editor, *The Automobile*, New York City, which, now that electric starting and lighting is becoming more popular on motor trucks, should be of interest to a number of readers of THE COMMERCIAL VEHICLE.

In Mr. Schipper's work he has analogized the electric circuit to a circle, a very happy analogy and one which makes the functions of the different elements of an electrical system and their troubles readily understandable and easily conceived in the mind. The book consists of three parts, entitled Automobile Electricity, Locating and Curing Troubles.

The subject has been handled in a clear and logical manner and in a style whose charm is almost poetic. The matter is far from visionary, however, being the result of much study and personal contact with each of the troubles discussed, gained in practical experience in repairing electric systems on motor vehicles.

Part I comprises principally a brief treatise on electrical phenomena and principles, based on Mr. Schipper's circular analogy, giving the fundamentals of tracing faults by a process of elimination. Part II treats of methods of tracing troubles by symptoms and classifying troubles by symptoms. Part III is devoted to the location and remedy of troubles by units.

There are two editions of this work, one with a heavy paper back, at $0.50 and one in leather at $0.75. The book is published by the Class Journal Co., 231 West Thirty-ninth Street, New York City.

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New Drive in Light C. T.s

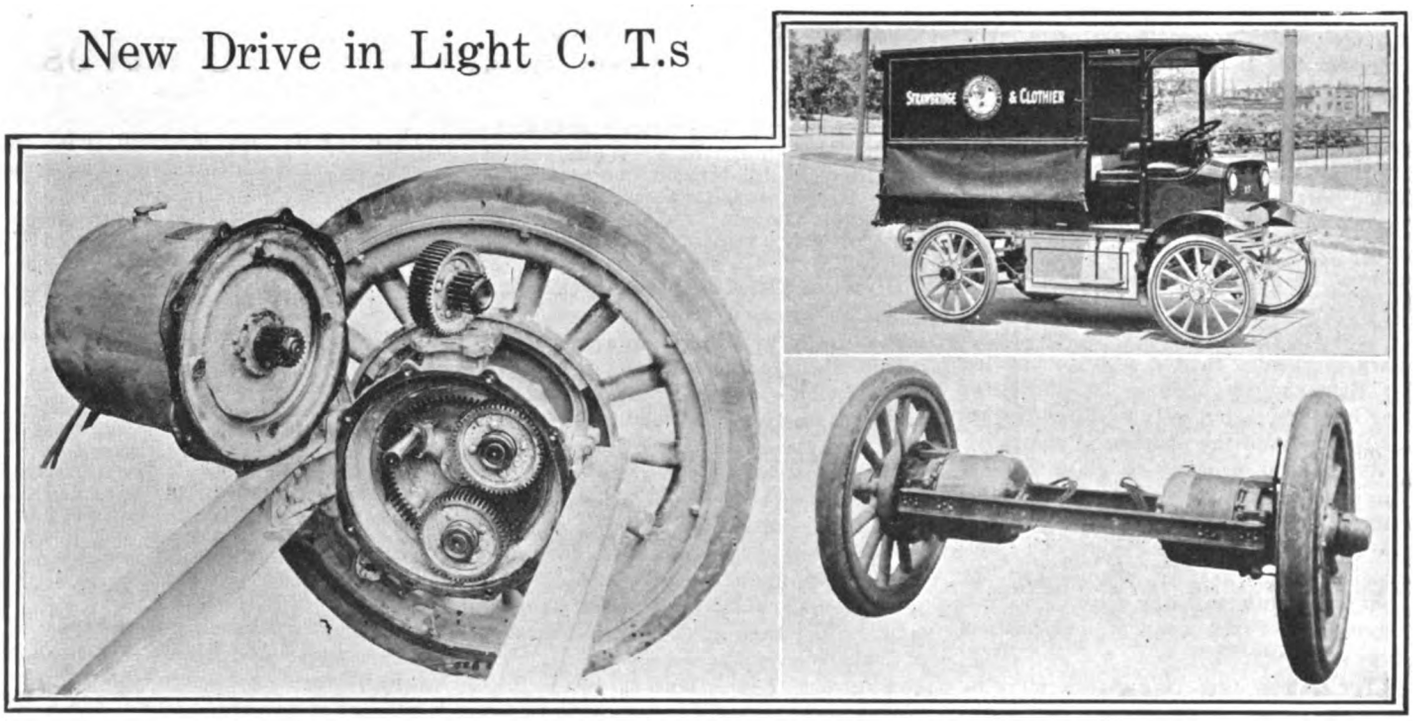


Fig. 1—1,000-lb. C. T. electric, with details of rear axle and new form of concentric-gear drive

TWO-MOTOR concentric-gear drive has been substituted for worm-drive in the smaller models of C. T. electric trucks, built by the Commercial Truck Co., Philadelphia, Pa. This form of drive is somewhat similar to that used on the larger C. T. models and renders the design much more elastic for adaptation to varying needs of purchasers. In this construction the axle becomes a complete power unit, structurally independent of the rest of the chassis, so that the controls and the battery may be located anywhere desired.

Three models are equipped with this type of drive, these being of 1,000, 2,000 and 4,000 pounds capacity.

In lay-out the new models are of the platform type, that is, all working parts are below the frame, leaving the space above in the form of an open platform. The battery is hung in a cradle beneath the frame, the controller is housed in the base of the steering column and the motors are in the rear axle.

In battery equipment three choices are offered, Philadelphia thin-plate, Ironclad-Exide and Edison, each at a different price. The motors are of the usual series-wound type, bolted, as may be seen in the illustration on this page, directly to the gear case in the hub of each wheel. The axle comprises two I-beams which are attached to these gear-cases on both sides of the motors.

C. T. SPECIFICATIONS

	1,000	2,000	4,000
Capacity, lbs.	1,000	2,000	4,000
Price	$1,500*	$1,800*	$2,200*
Wheelbase	90	100	116
Tires, front	36 x 3	36 x 3½	36 x 5
Rear	36 x 3	36 x 4	36 x 3½d
Number cells	42†	42†	42†
Amp.-hr. cap.	153†	204†	255†
Horsepower	2½	3½	5
Speed, light, m.p.h.	15	14	12
Loaded, m.p.h.	13	2	10
Speeds forward	4	4	4
Final drive	Concentric gearing		

*Without battery.
†With thin-plate Philadelphia battery, other batteries optional.

The drive gearing consists of what is practically an internal-gear drive, but different from it in that the driving pinion and the driven internally-toothed ring-gear are concentric and connected by a cluster of three idler gears. This construction equalizes the stresses, provides for many more teeth in engagement and makes for silence.

The use of two motors permits of high power without the use of a large and bulky motor and provides a differential action that is positive at all times.

Double radius rods take both torsion and propulsive stresses. The steering wheel is to the left, the controller being actuated by a smaller wheel below it.

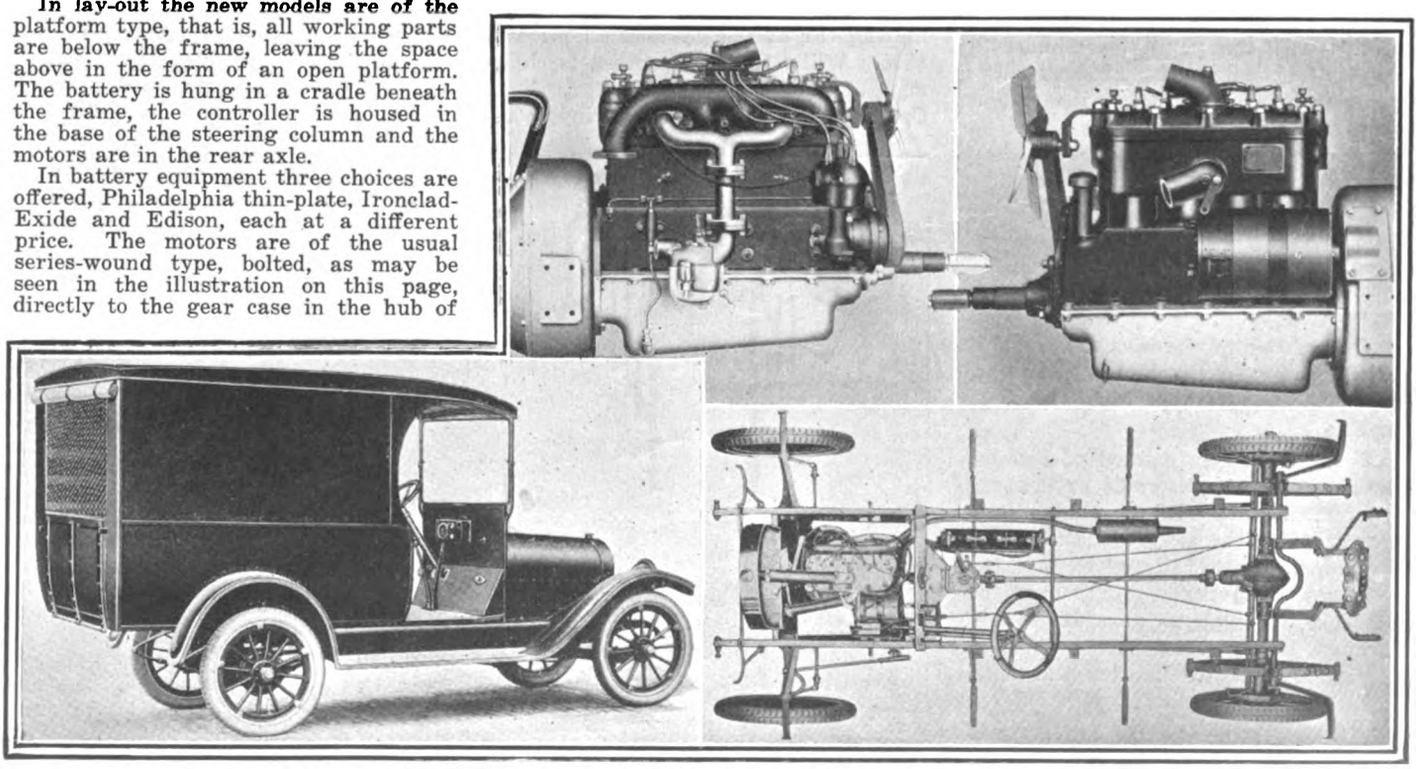


Fig. 2—The Brown 1,000-pounder with a plan of the chassis and both sides of the Le Roi unit power plant

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New Brown 1,000-pounder

Three Body Types Fitted to Touring Car Chassis Model

ON the same chassis as its passenger models, the Brown Carriage Co., Cincinnati, Ohio, is building three types of commercial vehicles, one with an inclosed body, another with an open express type and a third with a top and roller curtains.

A feature of the Brown delivery chassis is the provision of electric starting and lighting, the same system as on the touring car. In fact the entire chassis for the commercial service is identical with that for passenger work, the only difference being in the types of bodies applied.

The motor is conventionally located under a hood with louvres and modish rounded and flaring lines. It is a Le Roi and mounted in unit with the clutch and gearset, the whole powerplant being suspended on three points. The valves are at the right and the cylinders cast in block. Cooling is accomplished by thermo-syphon circulation through the sheet-metal-incased square-tube radiator.

The carbureter is a Kingston, fed by gravity from a tank beneath the seat. There is no governor. Ignition is provided from the battery on the Atwater Kent system, spark advance being automatic.

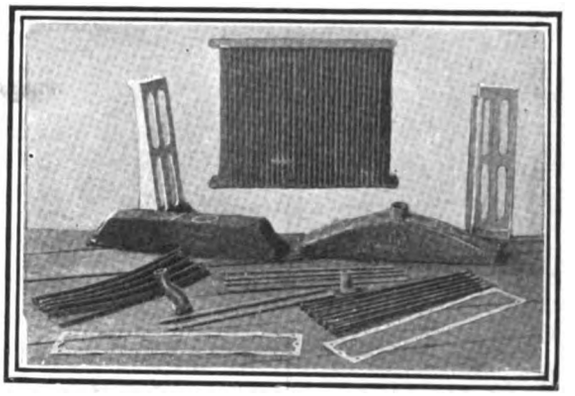


Fig. 3—New type of radiator used on Krebs chassis, disassembled to show construction

The starting and lighting system comprises an Allis-Chalmers single-unit motor-generator on the left side of the motor at the rear and a U. S. L. battery.

A Raybestos-faced dry-disk clutch transmits the power to the three-speed selective gearset, from which a shaft leads to the Walker-Weiss bevel-driven rear axle.

Tires are mounted on demountable rims.

BROWN SPECIFICATIONS

Capacity, lbs.	1,000
Price, express body	$675
Wheelbase	105
Tires, front	30 x 3½
Rear	30 x 3½
Bore	3⅛
Stroke	4½
N. A. C. C. hp	15.64
Final drive	Bevel

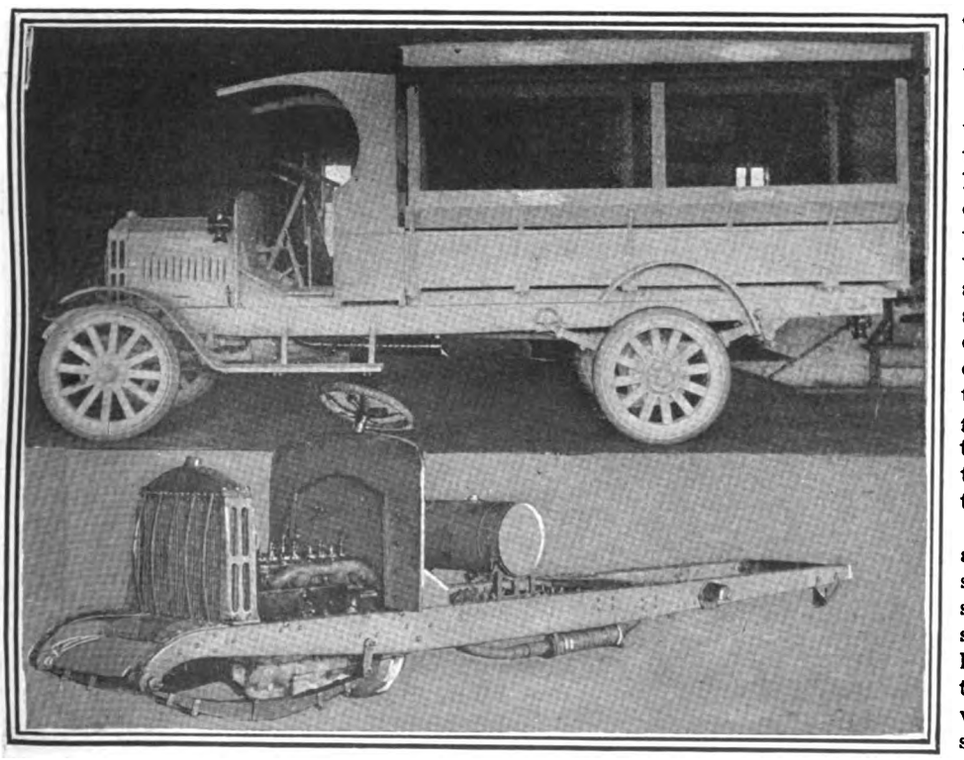


Fig. 4—Krebs 2-tonner complete, above and in stripped form below. Note depth of frame and bars over new radiator design

New Line of Three Krebs

Radiator Location and Construction Is Chief Departure

REDESIGNED to conform with conventional ideas in truck construction, but not different from previous models in structural essentials, Krebs motor trucks, built by the Krebs Commercial Car Co., Clyde, Ohio, are now offered in three sizes of 1½, 2 and 3½ tons capacity. Formerly the Krebs line comprised ¾-, 1-, 2- and 3-ton trucks with their motors under French hoods and their radiators on their dashes.

The new line is of the conventional type, with a new type of radiator of the vertical-tube built-up pattern, the feature of which is the use of plain drawn copper tubes instead of the usual finned variety.

The Krebs governor, which has always been the characteristic feature of this line, is retained. This governor not only limits the maximum speed of the vehicle, but it provides automatic control of the throttle. By means of its use it is possible for the driver to set his controller lever at any desired speed within the limits prescribed and the governor will maintain the truck speed in that gear regardless of road conditions. The governor gives the required rapidity of acceleration, but prevents too-rapid opening of the throttle or acceleration of sufficient sharpness to do injury to the truck.

It comprises a centrifugal governor whose setting is controlled by a lever on top of the steering column. When this lever is set for a given speed the governor will leave the throttle open until that speed has been attained, when it will close down sufficiently to prevent any greater speed. If an obstruction, such as a hill or a stretch of sand, is encountered, the governor responds by opening the throttle more, thus keeping the truck speed constant. If a downgrade is encountered it reacts by closing the throttle until the speed is reduced to the set maximum. In all of these operations it is entirely automatic.

It is driven directly from the motor and therefore serves to keep the idling speed of the motor down to where it should be. It should be very difficult to stall the motor of a Krebs if anything like ordinary caution is observed, and the governor furthermore offers the advantage of an evenness of speed not possible of attainment with manual control, so that with no greater maximum speed it is possible for the truck to cover more

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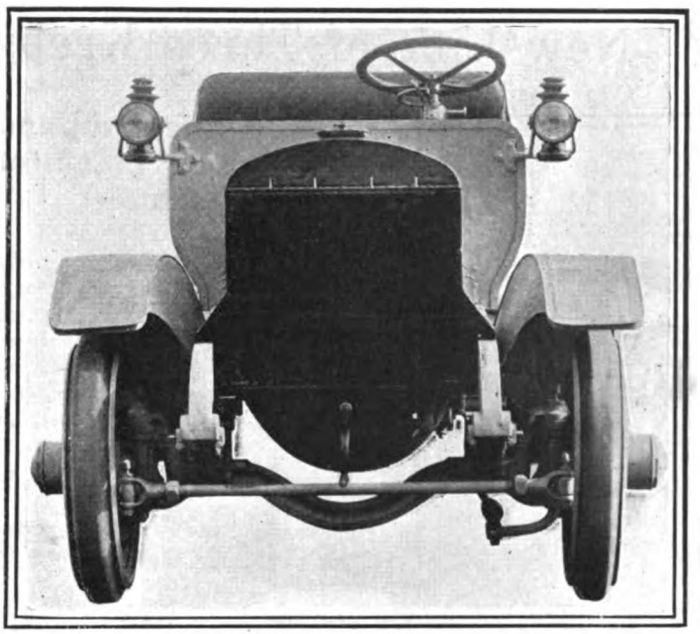


Fig. 5—Indiana 5-tonner, head-on, showing massive lines

5-tonner Last Indiana to Drop Chain Drive

New Line Has Changed Load Capacities

CAPACITY changes have been made in the line of the Indiana Truck Co., Marion, Ind. The former capacities were 1, 2, 3 and 4 tons. The larger models were also chain-driven. To-day all models are worm-driven and their capacities are 1, 2, 3½ and 5 tons.

The 5-tonner is the newest convert to worm drive. It is practically the same chassis as the 4-tonner except that there are several features which have been strengthened to sustain the heavier loads and it has been fitted with a 5⅛ by 5½ motor instead of the 4¾ by 5½ type formerly used. Likewise the 3½-tonner has been provided with a larger motor, a 4¼ by 5¾ taking the place of 4⅛ by 5½.

The motor on the 5-tonner is a Wisconsin, with valves opposite and cylinders cast in pairs. It is cooled by centrifugal pump circulation through a finned-tube radiator in a cast case. The carbureter is a Schebler, fed by gravity from a tank beneath the seat. A centrifugal governor is fitted, driven from the motor.

Ignition, on the single plan, is supplied by a Bosch magneto, spark advance being regulated by hand.

The motor is suspended directly from the frame on four points, the gearbox being mounted separately and the frame construction being of the rigid variety.

ground in a given time, even with very ordinary operating skill.

The 3,000-pounder has a Continental block-cast engine with valves to the left, suspended on three points and incorporating the gearset in a unit powerplant.

Cooling is effected by centrifugal pump circulation through the built-up vertical-tube cast-case radiator. This radiator is illustrated in its knocked-down state at the top of page 31. It is of exceptionally rugged design, all joints being gasketed instead of soldered and the copper tubes amply protected by stout bars bolted to the radiator tanks themselves. Not only does this construction present a neater appearance than an applied type of radiator protection, but it is less in the way. The radiator is built entirely in the Krebs shops.

A Zenith carbureter is fitted, fed by gravity from a tank beneath the seat. Ignition, on the single plan, is provided by a Bosch magneto with hand spark advance.

A Brown-Lipe dry-disk clutch drives the Brown-Lipe four-speed selective gearset. This gearset affords direct drive in the fourth speed. Final drive is by a single shaft with two universals to the Timken worm-driven rear axle.

Torque and propulsion are taken on the Hotchkiss principle. Either right or left steer will be furnished, the levers being in the center.

The 2-tonner is almost identical with the 1½-ton model except that it is larger and heavier. It differs, however, in the disposition of the gearbox, which on this model is independently mounted amidships to lessen the free length of shafting to prevent whipping of the shaft. On this model radius rods will be fitted or omitted, at the purchaser's option.

The 3½-tonner is a reproduction of the smaller sizes to a larger scale, the chief points of difference in its design being in the use of a pair-cast motor, an amidships gearbox, radius rods and right steer and levers only.

Features of the Krebs trucks are the absence of mud-pans beneath the motors and exceptionally deep, tapered, pressed-steel frames of the flexible type. These frames are constructed with but one cross-member back of the driver's seat, this being of exceptional width and very heavily gusseted to the side-members. This gives great lateral stiffness, while leaving the frame torsionally flexible. The front end of the frame is heavily braced by large gussets from the spring horns to the front cross-member beneath the radiator.

KREBS SPECIFICATIONS

Capacity, lbs.	3,000	4,000	7,000
Price	$2,050	$2,375	$3,250
Wheelbase	144	162	180
Tires, front	36 x 3½	36 x 4	36 x 5
Rear	36 x 5	36 x 4d	36 x 5d
Bore	4⅛	4⅛	4½
Stroke	5¼	5¼	5½
N. A. C. C. hp.	27.20	27.20	32.40
Speed, r.p.m.	1,180	1,180	1,270
M.p.h.	15	15	13
Gear-ratio in high gear	8.5-1	8.5-1	10.33-1
Final drive	Worm	Worm	Worm

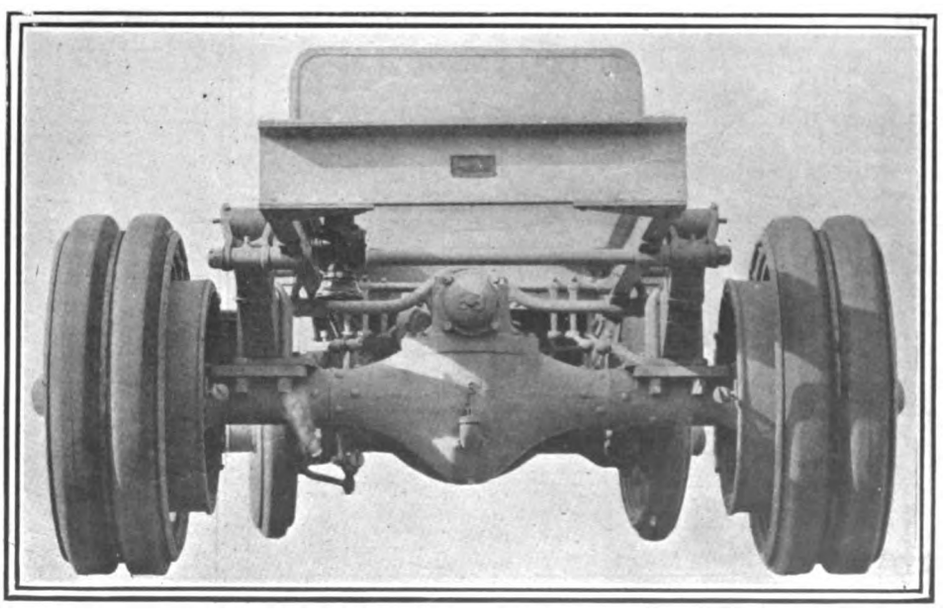


Fig. 6—Worm's-eye view of 5-ton Indiana's rear system, showing Sheldon axle

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Of the dry-plate type, the clutch drives the selective sliding gearset through a shaft with two universals. The gearbox is mounted amidships, where it splits the driveshaft into two sections of a length which is sufficiently short to prevent whipping. Final drive is by the latter half of the shaft line, also fitted with two universals.

Torque is taken by the rear springs, although radius rods are fitted to take propulsion. Left steer and central control are used on this, as on every other Indiana model, and the steel cab characteristic of this make is employed.

SPECIFICATIONS

Capacity	2,000	4,000	7,000	10,000
Price	$1,250	....	....	.....
Wheelbase ...	128	135	156	163
Tires, front..	36 x 3½	....	36 x 5	36 x 6
Rear	36 x 4	....	36 x 5d	40 x 6d
Bore	3½	4⅛	4¼	5¼
Stroke	5	5½	5¾	5½
N. A. C. C. hp.	19.61	27.20	32.40	42.20
Speed, r.p.m..	1,400	1,200	1,200	1,200
M.p.h.	20	17	14½	12
Gear-ratio in high gear..	7.75–1	7.75–1	8.75–1	11.75–1
Final drive...	Worm	Worm	Worm	Worm

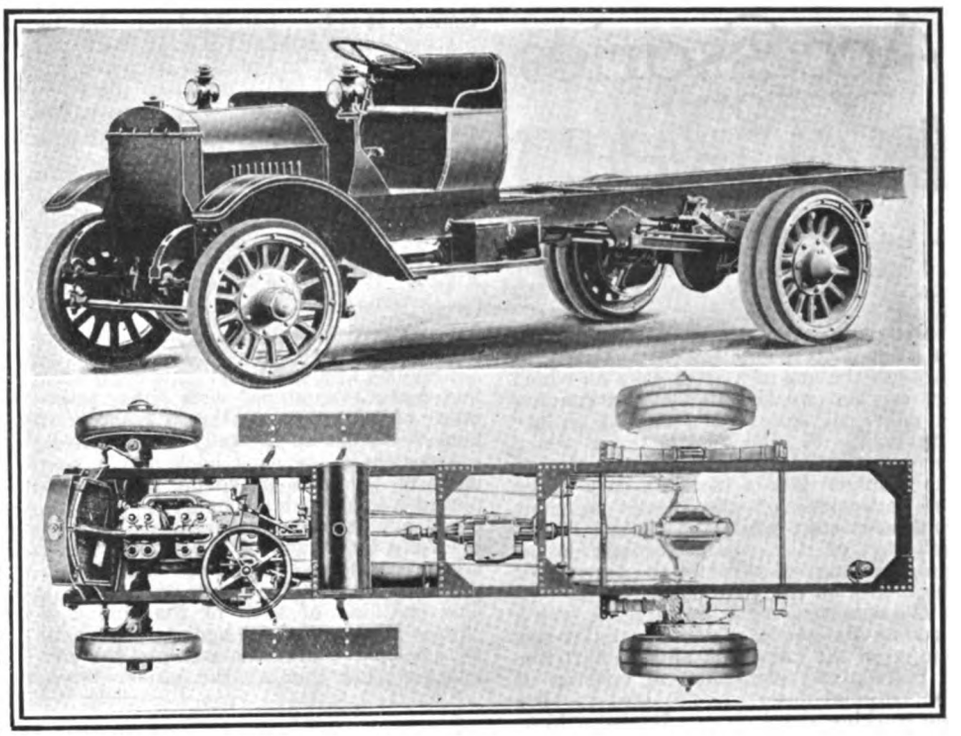


Fig. 7—Indiana 5-tonner, showing substantial lines

Niles Trucks in 1- and 2-ton Chassis

Structural Details Similar in Both

TWO models of Niles trucks have recently been placed upon the market by the Niles Car & Mfg. Co., Niles, Ohio. This concern has long been established in the railway car building industry, a specialty being electric street and interurban cars.

Niles trucks are of 1- and 2-ton rating, both types being very similar in design except for the size and strength of load-supporting parts. The lighter model has pneumatic tires, and the larger, solids. Hotchkiss drive is used on the 1-tonner and the 2-ton model uses radius rods.

Continental engines are used on both models. Both are block-cast with valves to the right and hung on three points. The 1-tonner has a unit powerplant, but the 2-ton model has its gearset amidships.

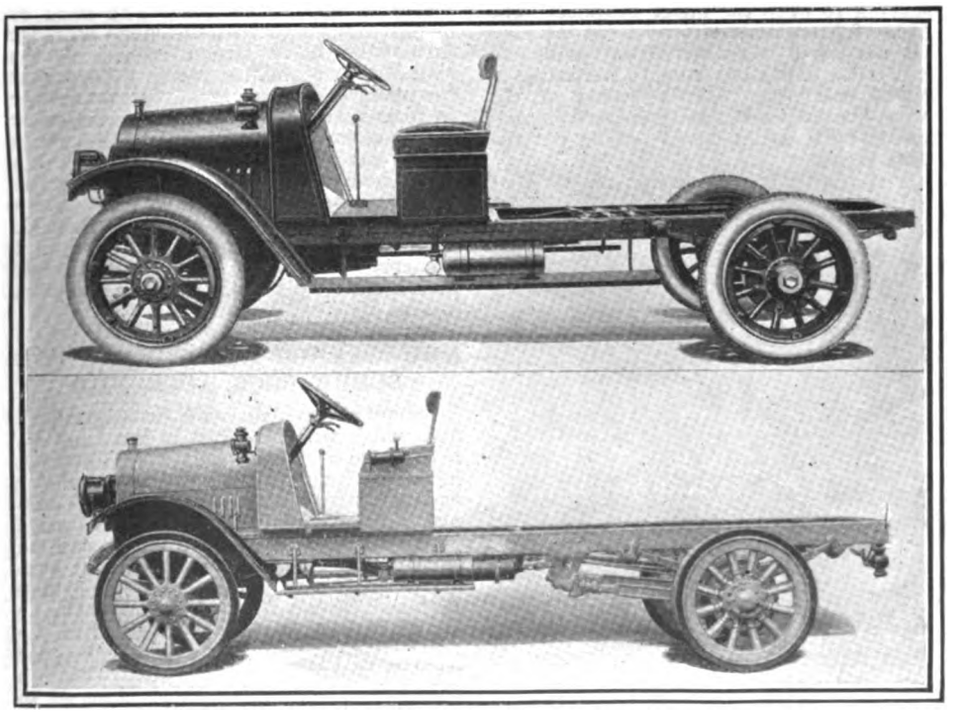


Fig. 8—Niles 1-tonner above and the 2-tonner below, showing similarity of design

Cooling is by thermo-syphon circulation on the smaller truck and by a centrifugal pump on the larger. Both models have Fedders square-tube radiators in sheet-metal casings, these radiators being mounted in cork-lined cradles to lessen vibration.

Stromberg carbureters and Pierce governors are used. Fuel feed is by gravity from tanks beneath the seats and the governors are driven from the motors.

Eisemann magneto ignition is used, on the single plan, spark advance being by a hand lever under the steering wheel.

Covert gearsets are found on both models, that on the smaller model being bolted to the flywheel bell-housing and inclosing a Covert dry-disk clutch. That on the larger is mounted on three points amidships and is driven by a Borg & Beck dry-plate clutch.

Final drive in both models is by shaft with double universals to Timken worm-driven axles. The radius rods which are used on the 2-tonner are I-beams secured to universals at their front ends, these joints being mounted on robust brackets which extend down from the frame.

Pressed steel frames are used, their construction being designed for flexibility. Left steer and central levers are employed, the steering columns having a pleasing degree of rake. Cowl dashes and well-winged fenders add a dressy tone to the front ends.

Niles trucks are to be sold direct from the factory at the list prices below, from which, it is said, no discounts are to be allowed.

NILES SPECIFICATIONS

Capacity, lbs.	2,000	4,000
Price	$1,175	$1,875
Wheelbase, in.....	124	140
Tires, front	35 x 5	36 x 4
Rear	35 x 5	36 x 7
Bore	3½	4½
Stroke	5	5½
N. A. C. C. hp.....	19.61	27.20
Speed, r.p.m.....	....	....
M. p. h.	25	15
Gear-ratio in high gear.....	....	....
Final drive	Worm	Worm

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Accessories for the Truck

M. & E. UNIVERSAL JOINT

Characterized by its simplicity and small number of working parts, the M. & E. universal joint, made by the Merchants & Evans Co., Philadelphia, Pa., and pictured in Fig. 6, is operative through the use of a steel yoke on which are carried two trunnion blocks running in spherical slots. The change in the angularity of the shaft in a plane through the longitudinal center line of the trunnion blocks is taken care of by the movement of the blocks in their spherical seats, while the change of angularity of the shaft through other planes is secured through the turning of the blocks on the yoke ends.

The spherical seats are integral with a circular flange to which a similar-size flange on the other end of the shaft line is bolted. A semi-spherical housing of conventional design is provided to keep the working parts clean. It also acts as an oil-tight casing to keep the grease around the working parts.

The joint is made in four different sizes. The shaft connections are of the standard S. A. E. ten-spline or square type of various sizes, according to the size of the joint.

RYERSON QUICK-CHANGE BEARING FOR FORDS

Ryerson quick-change bearings for Ford connecting rods are characterized by their skeleton construction, in which the babbitt is cast around a soft steel base. The base and the babbitt form an integral unit, which may be slipped in or out of the connecting rod in a few moments, thus eliminating the time usually spent in pouring the babbitt in a mold around the lower end of the rod, as is necessary if the customary procedure is followed.

The bearing base or skeleton is formed from a flat perforated soft steel plate, the perforations becoming distorted during the forming so as to give them the effect of being countersunk. After each skeleton is given the desired semi-circular form it is cleaned, heat-treated and tinned. It is then imbedded in babbitt by placing it in a mold and casting the metal around it. By this method a double adhesion of the babbitt metal to the skeleton is obtained, the first due to the countersunk effect of the perforations and the second due to the tinning. The bearings are then machine-finished. The skeleton construction gives considerable strength and rigidity to the bearing and affords a good anchorage for the babbitt. The bearing is shown in its parts in Fig. 1. It is made by Joseph T. Ryerson & Son, Chicago.

STANDLEY TRUCK SKID CHAINS

Standley adjustable non-skid chains for motor trucks equipped with either pneumatic or solid tires consist of a series of hooks attached to the felly of the wheel, a cross-chain for each hook and a ring made of ½- or ⅝-in. round, in which is placed a turnbuckle. The hooks are flattened out at one end for attachment to the felly by means of lag screws. The hooks themselves extend out slightly beyond the felly on the inside of the wheel. One end link of each of the chains is slipped over one of the hooks. The chain is then passed over the tread of the tire and the last link at the other end is slipped over the end of the ring carried on the outside of the wheel. The other chains are then passed over the ring, after which the latter is closed, as shown in Fig. 3, by screwing one end into the turnbuckle. The ring is not attached to the wheel in any manner, simply floating in the end links of the cross-chains and serving to keep the latter in place. The ends of the chains slipped over the ring are not rigidly attached at any point and can move along the ring to permit of a slight creepage. The tightness of the cross-chains over the tire tread is adjusted by screwing up or letting out the turnbuckle.

The chains are made for all sizes of tires of both the pneumatic and solid types, the cross-chains being made of ¼-, 5/16- and ⅜-in. stock, according to the capacity of the vehicles on which they are to be used.

The device is easily attachable to the wheel, the chains usually being kept on the ring when not in use, so that all that is necessary when fitting it is to unscrew the turnbuckle a short distance, slip the free ends of the chains over the hooks on the felly, and then take up the turnbuckle to give the required degree of tightness over the tread. The chains are made by the Standley Skid Chain Co., Boone, Iowa.

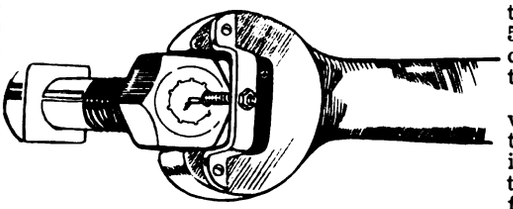


Fig. 2—The spanner wrench attachment designed for use in connection with Schum lock nuts to enable the latter to be turned off their bolts with ease

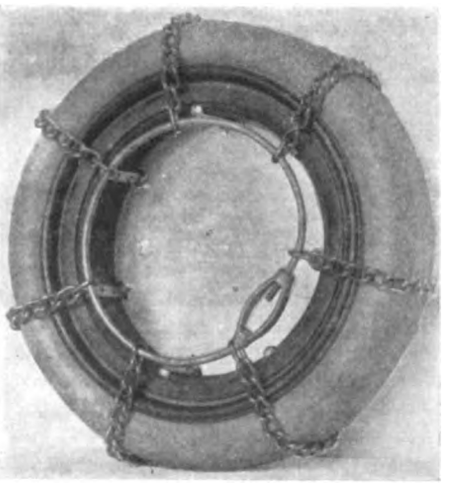


Fig. 3—The Standley adjustable non-skid chains for both solid and pneumatic tires, showing how the cross chains, attached to hooks on the inside of the felly, are passed over the tread and slipped through a ring of round iron on the outside of the wheel. A turnbuckle in the ring permits of the adjustment of the cross chains

R. & M. CONFORM PISTON RING

Made of three parts, the R. & M. conform piston ring, manufactured by the Modern Electric & Machine Co., Indianapolis, Ind., consists of a large triangular-sectioned member and two smaller pieces of similar section. The base or largest flat surface of the large member forms the inner circumference of the ring, the two smaller pieces fitting over the inclined surfaces of the large member to form a three-part ring of rectangular cross-section. Each one of the three pieces has a joint cut on an angle, these joints being staggered in assembling the ring in the piston groove to prevent the passage of gas through the ring. R. & M. conform rings are made in all sizes, and are carried in stock for practically all motor vehicle pistons. The ring is shown in Fig. 5.

NEW WRENCH ATTACHMENT FOR SCHUM BROS. LOCK NUT

Schum Bros., makers of the Schum lock nut, which was described in the June 15, 1916, issue of THE COMMERCIAL VEHICLE, have just brought out an attachment for spanner wrenches to enable the Schum nut to be changed easily from its locked to unlocked position so that it can be turned off its bolt. The attachment consists of a U-shaped metal piece or bridge fastened to the face of the wrench, as shown in Fig. 2. A hole is drilled at the center of the bridge and a smaller washer welded around it on the top. Through this hole is inserted a short plunger, to the bottom of which is attached an enveloping spiral spring, the other end be-

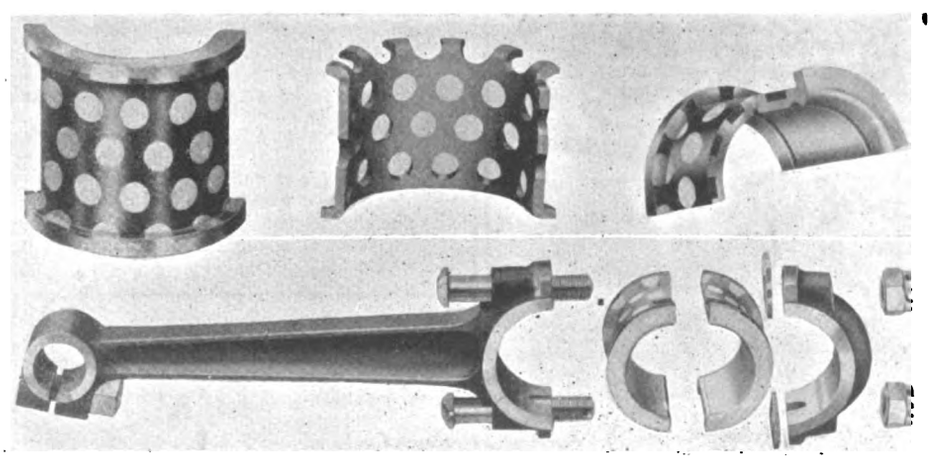


Fig. 1—The Ryerson quick-change bearing for Ford connecting rods, showing at the top the soft steel perforated skeleton which is the outstanding characteristic of the outfit. At the bottom is shown the unassembled unit, with the bearing skeleton filled with babbitt. Laminated shims are also provided to admit of easy adjustment

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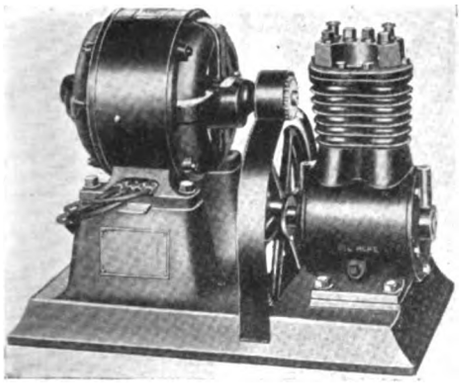


Fig. 4—A Ferro two-cylinder electrically-driven air compressor of the stationary type especially suited for use in small public or private garages and service stations

ing attached to the under side of the U-shaped piece. As the spring is compressed the free or upper end of the plunger moves up through the hole in the bridge.

To understand the operation of the wrench attachment one must remember that the Schum lock nut consists of an ordinary nut with ten vertical grooves cut through the threads; a movable paddle-shaped section, with serrations on the edges, which fits into a slot in the nut, and a spring which holds the serrations against the threads of the nut. The paddle has a guide at the opposite end which extends out through the head of the nut. When this guide is pushed down flush with the top of the nut the serrations of the paddles coincide with the threads, thus enabling the nut to be turned; but when the guide is forced out by the action of the spring after the pressure of the finger pushing it down is removed, the guide extends out of the nut, simultaneously causing the paddle serrations to become out of alignment with the threads and thus lock the nut.

The purpose of the wrench attachment shown in Fig. 2 is to force the guide down so that the nut can be turned without the necessity of holding the guide down with one's fingers during the turning operation. This is accomplished by putting the wrench down over the head of the nut so that the small plunger comes into contact with the guide of the locking paddle. As the wrench is pushed down farther until its jaws come into contact with the sides of the nut, the spring around the plunger is compressed and the plunger itself forced up through the bridge. Due to the tendency of the spring to regain its natural shape and carry the plunger with it, the latter exerts enough pressure on the nut guide to keep it forced down, thereby enabling the nut to be turned. The device is manufactured by Schum Bros., New York City.

FERRO ELECTRIC TIRE PUMPS FOR GARAGE USE

Designed not only for furnishing compressed air required in inflating pneumatic tires, two types of electric air compressors recently put on the market by B. M. Ferro, Wilkinsburg, Pa., are intended also to furnish air for the operation of small pneumatic tools, spraying, blowing dust and dirt from vehicles in garages, and for vulcanizing work. The compressors are offered in both the portable and stationary types, each in several different sizes. The complete line is designed to take care of the requirements of both private and public garages and service stations. All sizes follow the same general lines, employing Westinghouse alternating- or direct-current motors driving one- or two-cylinder air-cooled compressors through small gears mounted on the ends of the armature shafts and larger gears on the compressor shafts, as shown in Figs. 4 and 7.

The complete line includes the following: A single-cylinder horizontal unit of the stationary type driven by a ¼-hp. electric motor; a two-cylinder vertical compressor of the portable type, also driven by a ¼-hp. motor. This model is intended for the direct inflation of tires, and displaces 1.8 cu. ft. of air per minute at 500 r.p.m. with a pressure of 125 lb. per square inch. This model is shown in Fig. 7. In addition, another unit with two vertical cylinders is also offered, driven by either a 1/3- or ½-hp. motor, intended for the direct inflation of tires or for use in connection with an air tank. A heavy-duty type with two vertical cylinders is also offered, employing a ¾-hp. motor. This model is especially suitable for use in connection with a storage tank.



Fig. 5—The R. & M. conform piston ring which is made of three triangular-sectioned parts that form a ring of rectangular cross section when assembled

All types can be furnished with electrical pressure controllers if desired. These insure starting the motors at the minimum pressure set and stop them at the maximum pressure, thus giving ample tank pressures day and night without attention other than occasional oiling.

The entire Ferro line is designed with the view of producing machines which can be used for furnishing all of the compressed air necessary in the modern garage of small size. The small portable type which can be run off an ordinary lighting circuit is very handy to move about.

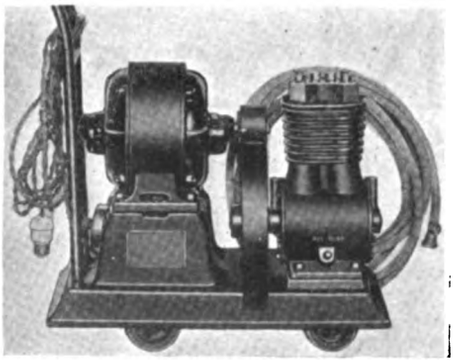


Fig. 7—A Ferro two-cylinder portable air compressor. It is electrically driven through gearing as shown. This type is designed for general use in small garages

Strange But True

Balls are fluid. Gold floats in the air. Rough intake manifolds condense and retard the flow of carbureted gas. These are certain facts which the Pierce-Arrow company took into consideration when it started the practice of putting 100 steel balls in each manifold and revolving it 3½ to 4 hours. The balls are a fluid, when small enough in size and sufficient in number and so they reach every surface in the pipe. Since gold is beaten so thin that the resultant foil floats in air by an infinite number of light blows well distributed, the similar action on the part of the balls results in a smooth interior surface on the manifold subjected to their action.

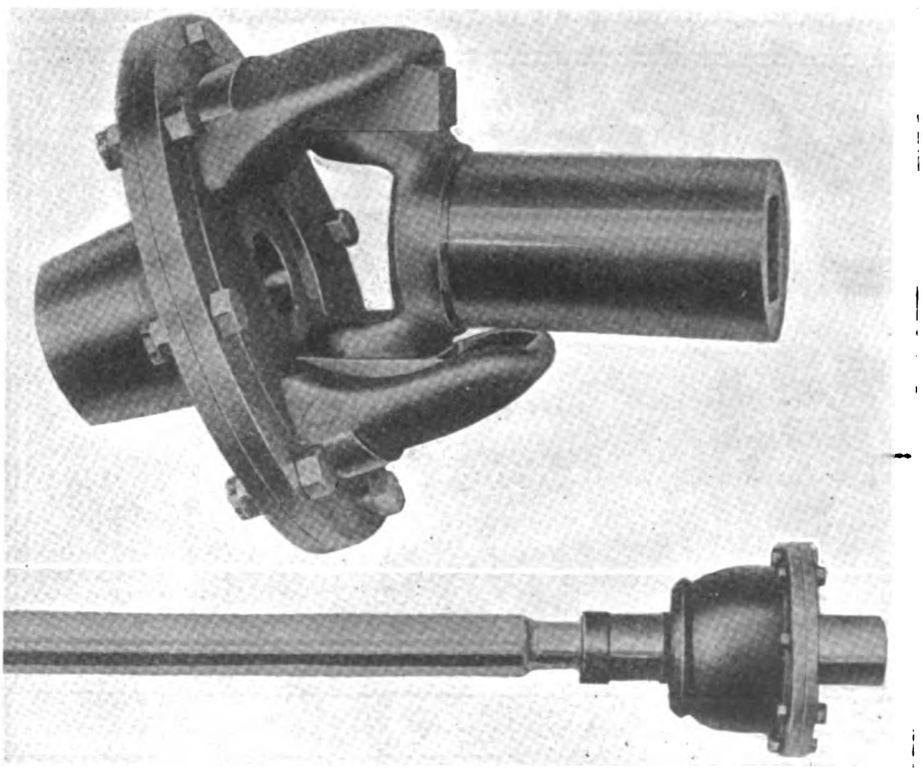


Fig. 6—The M. & E. universal joint, at the top with the casing removed and below, as it looks when applied to the shaft. The universal motion is accomplished through the use of a yoke on the ends of which are positioned two trunnion blocks which are constrained to move in spherical slotted seats

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Men and Makers

CLYDE MOTOR TRUCK CO. has secured a tract of 40 acres at Farmingdale, L. I., N. Y., and plans are now almost complete for a structure to be erected at the site. Ground will be broken shortly.

Wichita Falls Motor Co., Wichita Falls, Tex., maker of the Wichita motor truck, is planning to increase the capacity of its plant to take care of a large increase in orders. It has also recently increased its capital from $100,000 to $400,000.

Nevada Truck & Tractor Co., Nevada, Iowa, has recently been dissolved and the company's patents sold to interests in Minneapolis, Minn.

Moline Plow Co., Moline, Ill., has decided to enlarge its plant in order to take care of its tractor department and plans are under way by architects for the construction of buildings which will cost $1,000,000 and give employment to 1500 men. In order to provide the necessary land a change must be made in the right of way of the street railway company's tracks, a special election set for July 27 having been called to approve such a change. The company proposes to erect a machine shop, 100 by 765 ft.; foundry, 180 by 360 ft.; pattern vault, 64 by 230 ft.; core room, 60 by 122 ft.; mill room, 80 by 200 ft., and cupola room, 60 by 60 ft. Stone & Webster, the firm which built the Keokuk dam across the Mississippi, will construct the various buildings. The city will vacate a portion of a street, now unused, to co-operate with the company in the extension of its plant. The buildings to be erected are to be devoted exclusively to the construction of farm tractors. The demand has become so great that the present facilities are entirely inadequate and an extension becomes imperative. The contractor will put 1000 men to work in the construction in order to have them ready for occupancy by fall if possible. Brick will be utilized in the construction of the various buildings and they will be as nearly fireproof as possible.

Garford Motor Truck Co., Inc., Seattle, Wash., has opened a factory branch in that city for the sale of Garford trucks in the States of Washington, Oregon, Nevada, Utah, Idaho and British Columbia and Alaska.

Willys-Overland service stations in Boston, Springfield and Worcester, Mass., are practically finished, thus giving a chain of three big buildings across the State.

Sewell Cushion Wheel Sales Have Increased 300 Per Cent during the first quarter of the year, according to letters mailed by the Sewell Cushion Wheel Co., Detroit, to its thirteen branch offices throughout the United States. It is also stated that plans are now being formulated for the establishment of service stations in connection with the company's branch offices in Buffalo, N. Y.; Boston, Mass.; New York City; Philadelphia, Pa.; Baltimore, Md.; Minneapolis, Minn.; Rochester, N. Y.; Cleveland, Ohio; St. Louis, Mo.; Pittsburgh, Pa.; Los Angeles, Cal.; Seattle, Wash., and Chicago. At the present time only one service station is maintained, that being in Detroit.

Davis Mfg. Co., Los Angeles, Cal., was recently formed in that city for the manufacture of the Standard adapter for Ford cars, to convert them into 1-ton trucks. The company also manufactures parts for motor vehicle use.

Acme Universal Joint Co., Kalamazoo, Mich., will soon begin the construction of a new factory building to cost approximately $20,000.

M. L. Oberdorfer Brass Co., Syracuse, N. Y., which formerly limited its activities to the manufacture of brass, is now entering the finished-product field on a large scale and will manufacture brass bearings and bushings for the motor vehicle trade.

Sunset Battery & Ignition Wks. has opened a U. S. L. service station at 924 South Los Angeles Street, just one door south of the Master Carburetor Co.'s Los Angeles house.

The Firestone Tire & Rubber Co.'s Factory at Akron, Ohio, has been more than trebled in size during the past 5 years. This increase has been made wing by wing, and because of the foresight of the builders these additions have been made without loss in the plant's production efficiency. The reason for the great increase in the factory size is explained by a statement of sales recently issued by the Firestone company, in which it is stated that the sales had grown from $7,462,581.17 during 1910-1911 to $25,187,884.33 in 1915-1916, making a total increase of 257 per cent during the past 5 years. During 1915-1916 the increase to June 1 was 38 per cent in excess of the figures for the corresponding period of 1914-1915.

New Departure Co., Bristol, Conn., has completed plans for the erection of a U-shaped addition to be 300 ft. long. The company will use the structure for the finishing of the balls used in the New Departure bearings. Further enlargements of the plant are provided for by the recent purchase of additional land adjacent to the present plant.

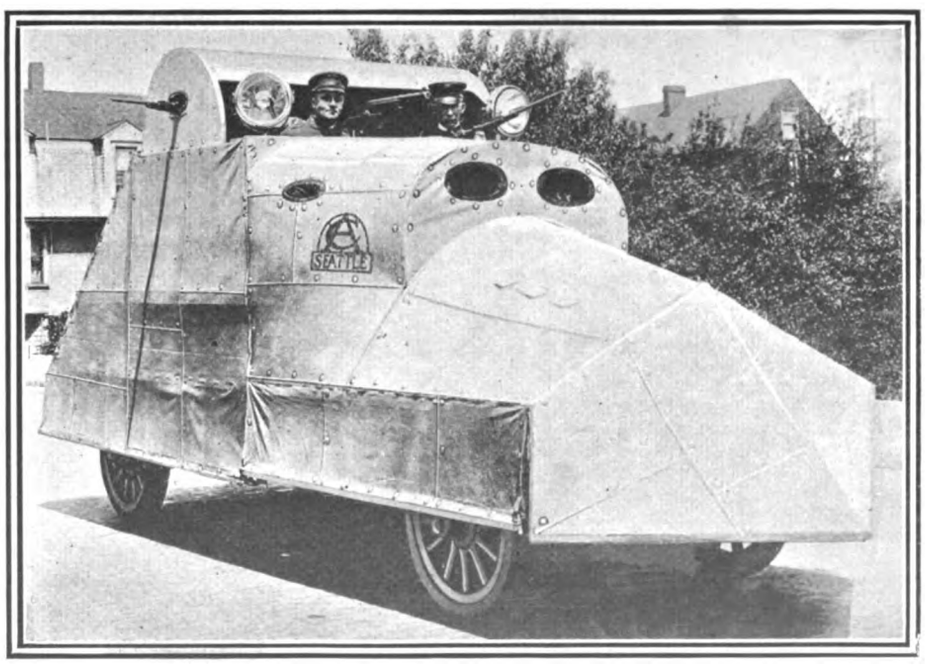
Quay-Norris Mfg. Co., St. Louis, Mo., maker of the Leak-Proof piston ring, has just completed an addition to its factory which increases the floor area of the plant by one-third and gives a 100-ft. frontage on Locust Street, in the heart of the motor vehicle district.

Sulzberger & Sons Co., Chicago, maker of curled hair for motor vehicle seats, has changed its name to Wislon & Co.

H. C. McComb has resigned as engineer of the General Vehicle Co., Long Island City, N. Y., to take up other engineering work. He has opened offices at 1414 Times Building, in New York City.

J. L. Moss has resigned as designing engineer for the International Motor Co., New York City, and has joined the Thomas Auto Truck Co. in the same city as chief engineer.

V. K. McBride, who has been identified with the sales department of the Federal Motor Truck Co., Detroit, for the past



Although this truck has real guns, its armor is made of canvas, it being a float which took part in the Seattle, Wash., preparedness parade. The vehicle, a Signal truck, was entered in the parade by the Automobile Club of Seattle and proved to be one of the most interesting features of the entire parade. Fifty thousand people participated in the demonstration including 9,000 women marchers. It took 3 hours for the column to pass through the business section of the city, where the sidewalks were literally filled with spectators

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2 years, has been appointed assistant sales manager of the company.

Forrest J. Alvin, until recently president of the New Era Engineering Co., Joliet, Ill., has just organized a new motor truck manufacturing concern in Joliet. No details of the vehicle to be marketed are available at this writing, although it is expected to be a truck of light capacity. Mr. Alvin was at one time general sales manager for Wheeler & Schebler, makers of the Schebler carbureter.

D. M. Ferguson has resigned as consulting engineer to the General Motors Co., Pontiac, Mich. His future plans are not available at this writing. Previous to his connection with the General Motors company he was chief engineer for the Studebaker Corp., Detroit.

Charles W. McKinley of the Willys-Overland Co., Toledo, Ohio, has been elected one of the councillors of the Society of Automobile Engineers and will serve for a 2-year period.

H. A. Conlon, formerly a special sales representative of the Federal Motor Truck Co., Detroit, in England, has returned to this country and has been appointed to the position of field sales manager.

A Federal Truck Sales Conference was held last week at the plant of the Federal Motor Truck Co., Detroit, at which the sales representatives were present to discuss plans for the next few months. Those present included J. F. Bowman, director of sales; L. C. Long, J. I. Martin, E. D. Jones, L. W. Phillips, H. M. Rosenberg, W. S. Hill, R. S. Smith and J. A. Holihan.

A. W. McKenzie, western district sales manager for the Garford Motor Truck Co., Lima, Ohio, has been placed in charge of sales in the territory of the new factory branch of the same company recently opened in Seattle, Wash. He is assisted by Charles A. Eastman, formerly with the White company, who has been appointed manager of the Seattle branch. Salesrooms and service station are maintained at 1726 Broadway in that city.

W. Scott Johnson has been appointed manager of the Stewart Truck Sales Co., distributor of Stewart trucks in Southern California. The offices of the concern are at 1330 South Flower Street.

Ferdinand Jehle has just resigned as laboratory engineer of the Automobile Club of America, New York City, and has accepted the position of service engineer for the Aluminum Castings Co., Cleveland, Ohio.

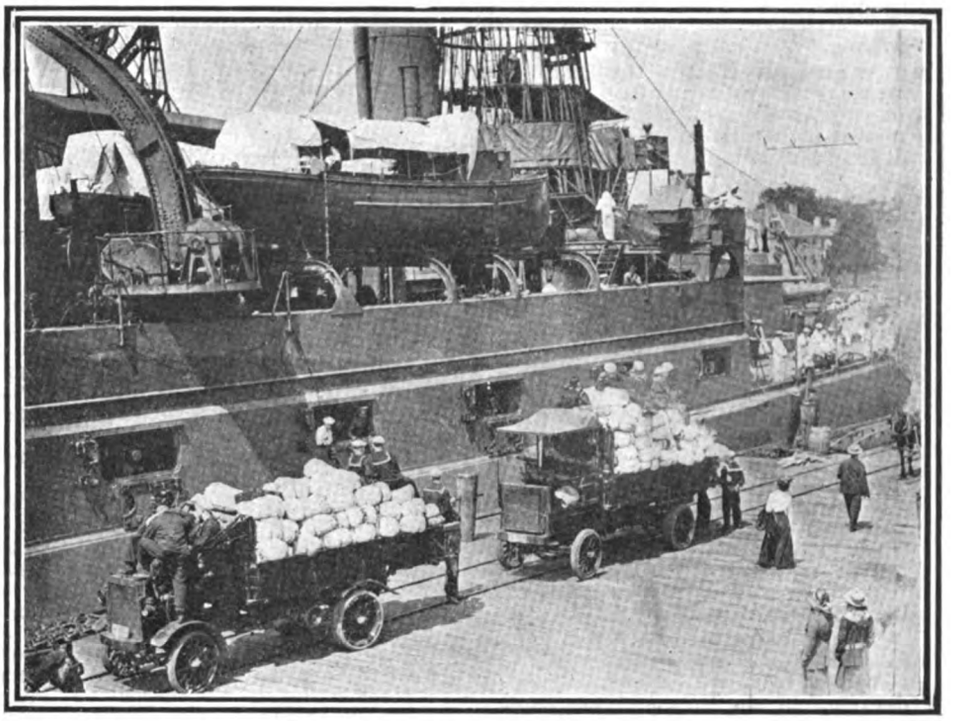
Harry L. Horning of the Waukesha Motor Co., Waukesha, Wis., has been nominated as one of the councillors of the Society of Automobile Engineers. He will serve for 2 years.

C. J. Cadwell has been appointed sales manager of the Miller Carbureter Sales Corp., with headquarters in Los Angeles, Cal.

T. F. Russell, Springfield, Mass., has taken the Hampden County agency for the Redden truck adapter and has opened salesrooms at 85 North Main Street in that city.

E. M. Lied, formerly zone manager for the Willys-Overland Co., Toledo, Ohio, in the New York City territory, has been appointed assistant to E. B. Jackson, the head of the new Overland sales branch in that city.

Edwin B. Jackson, president of the Packard Motor Car Co. of New York, has resigned to become manager of the new Willys-Overland branch in New York City. He will act in concert with C. A. Earl, vice-president of the Willys-Overland company, in completing the organization of the Overland branch and in establishing other branch offices in the surrounding territory.



A recent scene in the Charlestown navy yard at Boston, Mass., showing one of the battleships of the American navy which has been turned over to the naval brigades of the states along the Atlantic seaboard for actual battle practice at sea. All of the baggage and supplies of the brigade were transferred from the railroad stations to the battleship by means of motor trucks, two of which are shown in the above illustration. The one at the left is a Speedwell truck and that at the right an Alco

H. F. Harris, formerly assistant manager of the L. Michael Co., Chicago, has been appointed comptroller of the new New York City branch of the Willys-Overland Co., Toledo, Ohio, now established in the Circle Building, Broadway and Fifty-ninth Street, New York City.

R. D. Willard, formerly manager of the Carl H. Page Co.'s branch in Philadelphia, Pa., has been appointed sales manager of the new Willys-Overland branch in New York City.

S. D. Miller, formerly identified with the sales force of the Carl H. Page Co., Brooklyn, N. Y., as manager of the branch, has joined the Willys-Overland forces as manager of the Newark, N. J., branch of the latter concern.

L. F. Seeback, formerly manager of the C. T. Silver Co.'s Brooklyn, N. Y., branch, remains in that city as manager of the new Willys-Overland branch. The latter is temporarily located at 338 Flatbush Avenue.

210 Goodyear Employees Are Now With the National Guard along the Mexican border. Many of the executives and engineering experts of the Goodyear Tire & Rubber Co.'s organization are now in camp. Among these men are L. I. King, advertising manager; E. J. Welch, assistant advertising manager, and Ralph H. Upson, the aeronautical expert of the company and the world's champion balloonist.

F. C. Meyer, who has been in charge of the Des Moines, Iowa, branch of the Goodyear Tire & Rubber Co., Akron, Ohio, has been appointed manager of the Minneapolis, Minn., branch of the same company, succeeding G. H. Barmore, who has been appointed manager of the company's office at Milwaukee, Wis. Mr. Meyer's former position is filled by F. W. Telford, formerly supervisor of the sales of Goodyear motor truck tires in Chicago.

T. J. Fitzgerald has been appointed manager of the El Paso, Tex., branch of the Goodyear Tire & Rubber Co., Akron, Ohio, filling the position left vacant by the death of F. G. Dennis.

The Employees' Outing of the Miller Rubber Co., Akron, Ohio, which was to have been held at Silver Lake on July 15, had to be changed to Cedar Point, nearer Akron, because of the inability of the railroad companies to furnish sufficient equipment. The day was spent in picnicing and athletic games of all kinds.

B. C. Swinehart, at one time with the Swinehart Tire & Rubber Co. and recently with the Republic Tire & Rubber Co., Youngstown, Ohio, as manager of that company's Philadelphia, Pa., branch, has been made manager of the Republic company's motor truck tire department at the factory.

M. D. Montgomery, who has been manager of the Denver, Col., branch of the Goodyear Tire & Rubber Co., Akron, Ohio, during the illness and since the death of the late S. E. Gillard, has been confirmed as the new manager of that branch.

Fred H. Ayers, New England manager of the Fisk Tire Co., Chicopee Falls, Mass., for some years past, has been appointed general supervisor of districts.

H. R. O'Keefe, who has been connected with the Los Angeles branch of the Goodyear Tire & Rubber Co. as traveling representative, has joined the Goodyear forces at Fresno, Cal. O'Keefe was formerly located at Seattle, Wash.

A. A. Martin, vice-president and general sales manager for the Burd High Compression Ring Co., Rockford, Ill., resigned from that concern on Aug. 1, having fulfilled his contract with the Burd

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company to make it a going concern. His new activities are not known at this writing.

A Ford Operates a Tungsten Mine, owned by Hugh Leonard in Atolia, Cal. In view of the demand for tungsten ore for use as an ingredient of steel and for making filaments for incandescent lamps, a mine that can be operated cheaply means enviable profits. Mr. Leonard's chief visible asset is a hole in the ground 100 ft. deep. The total overhead is a tripod derrick and the Ford. A cable with a bucket at its end is run over a pulley on the derrick and then to the rear axle of the Ford, which makes 100-ft. trips backwards and forwards to bring the bucket and its valuable contents to the surface.

The Joseph Tracy Motor-Testing Plant, located on Montross Avenue, East Rutherford, N. J., has recently installed a late model of Sprague high-speed electric dynamometer, two hydraulic brakes and a chassis-testing machine of the rear-wheel type. Tests of various kinds may now be conducted at the Tracy plant with the sanction and under the supervision of the American Automobile Association.

"The Manufacture of a Motor Vehicle" is the title of a moving picture film just completed by C. R. Bosworth and Joseph deFrenes at the Toledo, Ohio, plant of the Willys-Overland Co. The operators spent nearly 3 months in the making of the film, working 8 hr. every day, from 7 a. m. to 4 p. m. To move the picture-taking apparatus through the miles of factory area required the services of five electricians and the use of ten specially constructed handtrucks operated by twenty men. The wire to supply the electric current for the proper lighting of every portion of the factory in which all the processes entering into the manufacture of the Overland vehicle were to be filmed took more than 1 month to rig up. Switches were so placed that in a moment's time any part of the plant could be lighted up for the filming, no matter whether it was raining or snowing outside.

"Mosler on Spark Plugs" is the title of a small pocket-sized, sixteen-page booklet just issued by A. R. Mosler & Co., New York City. It gives tables of the sizes of spark plugs used on practically all 1916 passenger cars and motor trucks, and the types of Mosler plugs recommended for use on each particular make. It also gives a table of lengths of spark gaps as recommended by the leading ignition manufacturers. A list of the sizes of spark plugs used on farm tractors and the leading makes of motorcycles is also given. The book should prove of value to all users of motor vehicles, as well as to dealers and jobbers.

More than 5000 Studebaker Employees from the Detroit and Walkerville, Ont., Canada, plants of the Studebaker Corp., Detroit, participated in the annual outing, held on Saturday, July 1, at Sugar Island, on the Detroit River. Two boats, the *Greyhound* and the *Wauketa*, were chartered to accommodate the crowds, which constituted practically the entire forces of the two plants mentioned above and which were shut down for the day. Athletic games and sports of all kinds, including a game of baseball between the Studebaker and Maxwell teams, occupied the day's program, with dancing in the evening. The start was made for Sugar Island at 8.30 a. m. The first boatload returned to Detroit at 5.30 p. m. and a later trip was made in the evening for those who preferred a moonlight sail home.

Three Hundred and Fifty-seven Thousand AC Spark Plugs made by the Champion Spark Plug Co., Toledo, Ohio, were recently sold in one order to the Motor Car Equipment Co. of Boston, Mass., and New York City. This is said to be the largest order for spark plugs ever placed, and tops the order placed by the Beckley-Ralston Co., Chicago, for 300,000 plugs contracted for last month.

An American Motor Bus Line Will Be Established in China by an American company which has just been granted an exclusive franchise for 20 years to run a motor freight and passenger line over a new road which the company will build and finance. A loan of $54,600 United States gold at the present rate of exchange in China has just been consummated with the Governor of Pekin through the efforts of the company. The highway will extend from the city of Pekin to the Western Hills, the summer palace of former kings, by way of the Marco Polo bridge. It is understood that the building of the new highway is only the first step in an extensive plan of public-road construction in Chihli province.

Deaf Mutes at the Goodyear Factory in Akron, Ohio, are placed in squads under supervisors able to converse with them in their sign language, and under these conditions they have proved very efficient workmen. Care has been exercised in assigning them to tasks from which the accident hazard has been practically eliminated. That the Goodyear company has provided well for their personal safety is evidenced by the fact that in the 2 years they have been at work not one of the fifty mutes employed has experienced an accident. The training these men have received has proved so efficacious that they are now able to compete successfully with their more fortunate brothers.

A Koehler Wall Poster in two colors has recently been issued by the H. J. Koehler S. G. Co., Newark, N. J., maker of the Koehler 1-ton internal-gear-driven truck. The folder is on heavy white paper, 25 by 32 in., with metal guides at top and bottom. It pictures the 1917 Koehler truck, which is sold at $895 in the chassis, and in addition gives short specifications of the vehicle.

"The Blue Book of Traffic" is the title of an elaborate sixty-four-page booklet just issued by the Federal Motor Truck Co., Detroit, in which is offered a large collection of photographic reproductions showing some of the many uses in which Federal motor trucks are engaged. In addition to the views of Federal trucks in actual service, the book also contains the condensed specifications of the 1½-, 2- and 3½-ton Federal chassis, a short description of the various units used in the Federal design, and line illustrations of the various types of standard bodies which can be furnished for Federal vehicles. In keeping with its title, the book is printed on light blue paper and has a darker blue cover with gold lettering.

"On the Firing Line With Battery Bill" is the title of a unique thirty-two-page booklet just issued by the Edison Storage Battery Co., Orange, N. J. The book is made up of a collection of illustrated letters supposed to have been written home from the road by W. Alkaline Battery, a fictitious salesman of the Edison company, telling of his experiences in selling Edison batteries to President X and other officers and department heads of an imaginary X. Y. & Z. railroad. The letters are filled with much humor and go to make up a booklet which is a distinct departure from the conventional form of advertising matter and one which at the same time contains a large fund of information for railroad men whose work brings them in touch either directly or indirectly with storage batteries.

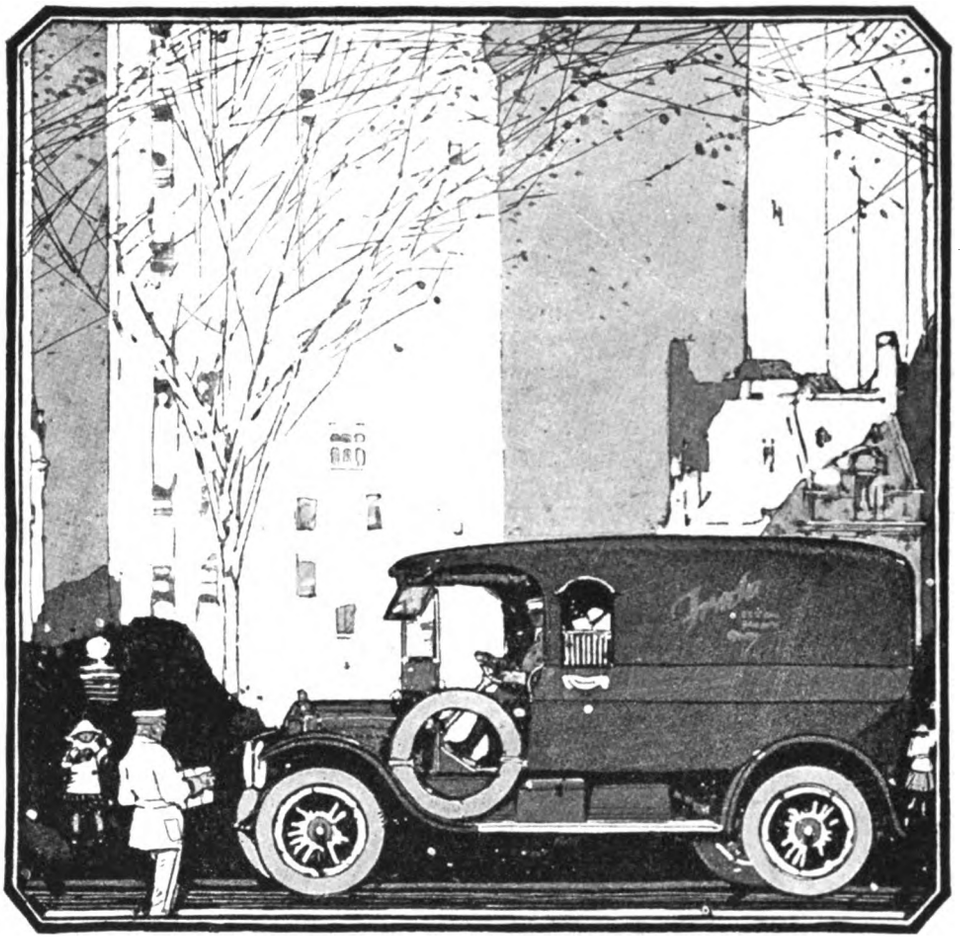
Recent Physical Tests of Road-building Rock made by the United States Department of Agriculture have been completed and the results formulated in a professional paper published by that department under the name of Bulletin 370. These tests have been conducted by the Office of Public Roads and Rural Engineering to give highway engineers information in regard to the various physical properties of different rocks most frequently used in road construction. The three most important of these properties are defined in the bulletin as hardness, or the resistance which the rock offers to the displacement of its surface particles by abrasion; toughness, or the resistance which it offers to fracture under impact; and binding power, or the ability which the dust from the rock possesses or develops by contact with water, of binding the large rock fragments together.

Fifty Real Indians Are Employed at the Ford Plant, these making up a delegation of students from the United States Indian School at Carlisle, Pa. The experiment of sending Carlisle students to the plant of the Ford company was tried out 2 years ago with twelve men. It proved so successful in the benefits derived by the students and by the influence they exerted upon their brother Indians when they returned to their reservations, that a quota of fifty is now kept full all the time. The students to be sent to the Ford factory are selected by their instructors at Carlisle upon the former's school standing and efficiency. Most of the students now at the plant work under the profit-sharing plan. They send back to their faculty at Carlisle one-third of their earnings, which is deposited and saved for them.

Commercial Vehicle Agencies Recently Established Throughout the Country

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Fort Worth, Tex.	Kisselkar.	J. E. Mitchell.
Livermore, Cal.	Kisselkar.	William H. Martens.
Loraine, Tex.	Kisselkar.	Tolar & Petty.
Lufkin, Tex.	Kisselkar.	Texas Motor Co.
New York City.	Kisselkar.	Ira L. Kohn.
Paris, Tex.	Kisselkar.	W. F. Dulaney & Sons.
Sacramento, Cal.	Kisselkar.	Christie Motor Car Co.
Santa Barbara, Cal.	Kisselkar.	Charles L. Krug.
Wichita Falls, Tex.	Kisselkar.	Kisselkar Sales Co.
Williams, Ariz.	Kisselkar.	B. F. Sweetwood.
Amsterdam, Holland.	Koehler	Dirk Van Der Mark.
Calcutta, India.	Koehler	W. H. Wheeler Co.
Farner, Tenn.	Koehler	H. J. Crumley.
Havana, Cuba.	Koehler	F. Galban.
Knoxville, Tenn.	Koehler	Cadillac Sales Co.
Madras, India.	Koehler	The Motor Shop.
Mifflintown, Pa.	Koehler	Juanita Auto Co.
North Adams, Mass.	Koehler	W. S. Straus.

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Unequaled exactness and accuracy of race contour.

Concentricity unapproached by any other make.

Unequaled accuracy and uniformity throughout.

A simple one-piece separator safely permitting the use of the maximum number of maximum size balls.

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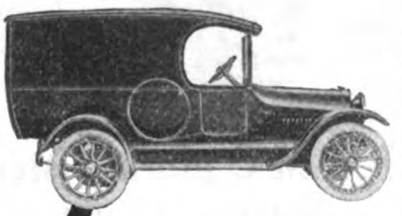


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Commercial Cars



This is ONE of the Studebaker line of Commercial Cars—the Panel Car at $875.

It is only ONE of SIX cars in the line, remember, but look at the selling opportunities that the Studebaker Dealer has with this car:

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20,074 Shoe Stores
68,075 Butchers
22,832 Clothing Retailers
1,589 Department Stores
32,288 Dry Goods Stores
8,000 Florists
155,580 General Stores
171,201 Grocers
30,504 Hardware Stores
11,093 Hotels
7,467 Laundries
5,543 Haberdashers

This is only a partial list of the national opportunities that this car has. And remember, this is only ONE of the line of SIX cars, each of which has selling possibilities fully as GREAT.

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1.	Panel Delivery Car	$ 875
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6.	Bus, 16-passenger	1400

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Maintain Compression— Minimize Friction

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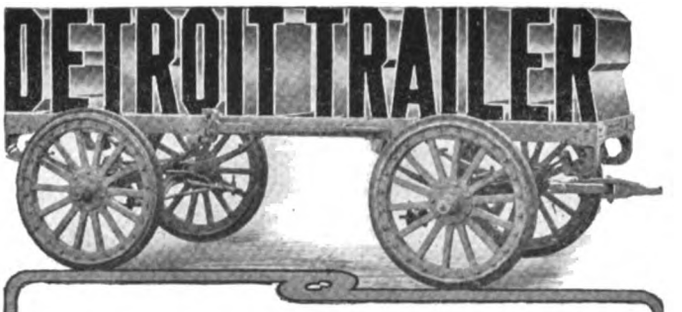
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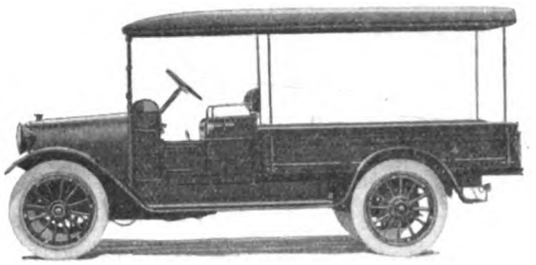
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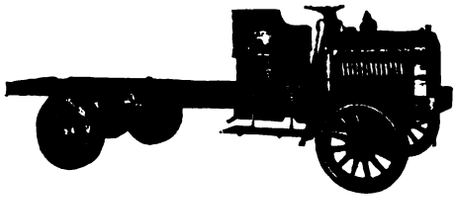
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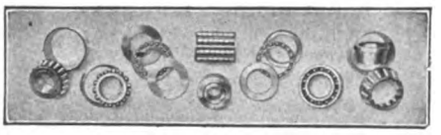
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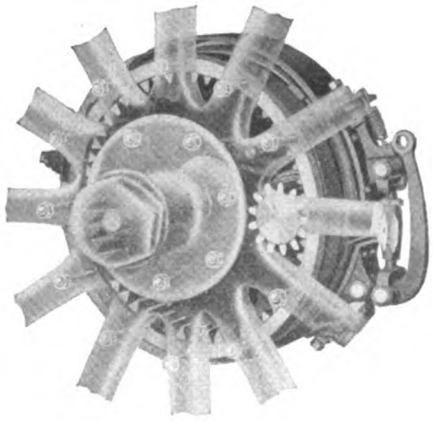
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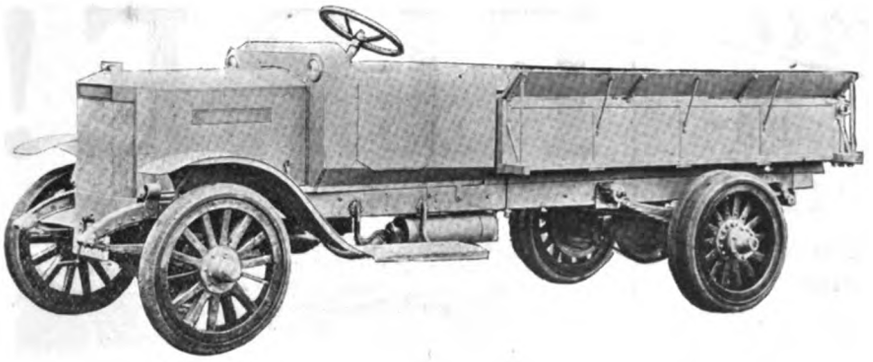
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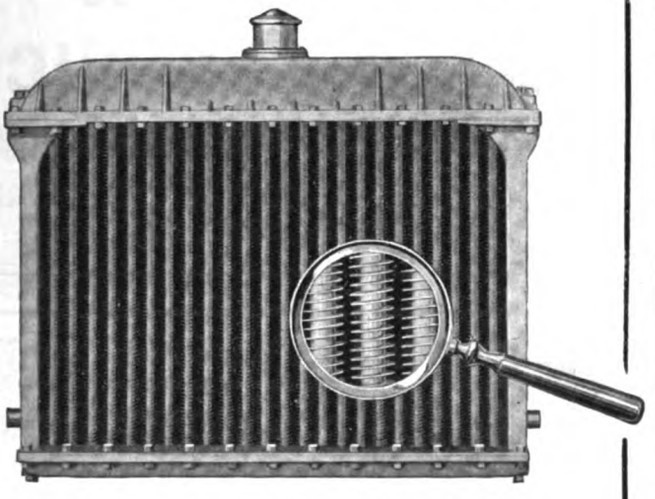
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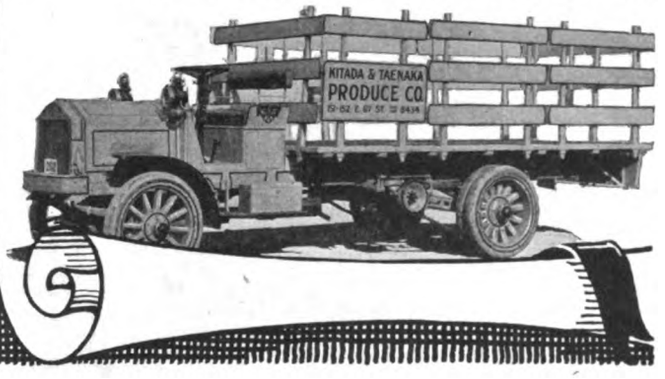
Startled the Motor Truck Industry By a Unique Sales Plan

First of all, the Standard is an unusual truck. It is a powerful combination of many of the world's best-known units—the Continental Motor; Timken Axles; Timken Bearings; Brown-Lipe Gears, and other well-known standard parts.

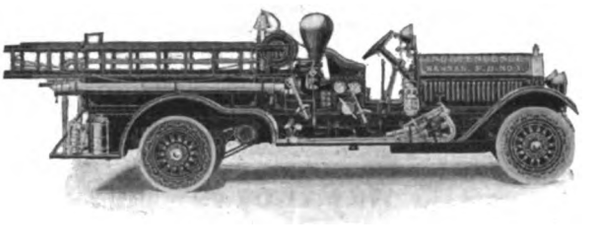
The Standard Motor Truck is sold in an unusual way. Any responsible person can be the agent for the Standard, with absolutely *no investment—no deposit* and *no contract.*

Write for details of this plan. No obligation.

STANDARD MOTOR TRUCK CO., Dept. 10, Detroit, Mich.



FIRE!



SOUTH BEND DOUBLE DUTY FIRE APPARATUS

Built for SERVICE

Reliability and Efficiency

SOUTH BEND MOTOR CAR WORKS
SOUTH BEND, IND.

Coal-Haulers

throughout the United States will welcome the news of this new invention in elevating bodies.

If you are thinking of increasing your fleet now or soon, please note that it is possible for you to order one or more of them at once, through your local dealer, regardless of the make of chassis you select.

Fits Any Truck

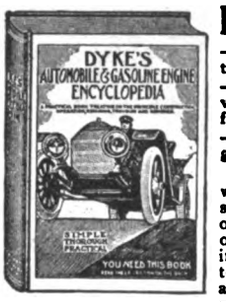


These bodies are built in all capacities, are equipped with power drive, and are safety locked during elevation. However, get the full facts, prices, etc., by writing in for descriptive bulletin No. 5. Do this now.

For the special information of dealers, we will be glad to supply further details.

The Lally Commercial Body Co.

EVERETT MASS.



HERE'S YOUR REPAIRMAN, Reference, Guide and Instructor (Simplified) 1750 illustrations, 696 pages, 49 instructions

Here's the Book You Need

—tells you how to diagnose and remedy any trouble.

—teaches you the PRINCIPLE of all engines, valves, carburetors, ignition, self-starters—in fact, everything you want to know.

—teaches you to overhaul a car from the ground up.

NOTE—The revised Book is now ready with many new subjects added. The electric section of the book is up to date and thoroughly treats on the principle, construction, operation and care of leading Electric Starting, Generating, Ignition and Lighting Systems. Delco, Atwater Kent, Bosch "two-point" and other systems are simplified.

Ford Instruction—complete—now added.
Six, Eight and Twin Six engines simplified.

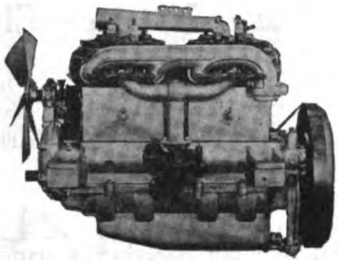
Price, $3.00 (add 25c to prepay)
If not satisfactory, return

Book Dept., The Commercial Vehicle
239 W. 39th Street, New York



Not made to meet a price, nor to shatter records of quantity, but to fulfill a service ideal—to be a true foundation for a worthy motor vehicle.
Continental Motors Company, Detroit, Mich.

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Beaver Motors Make Their Way By The Way They Are Made

BEAVER MOTORS are made by truck motor specialists. The concentrated experience of engineers of international reputation is embodied in their construction.

BEAVER TRUCK MOTORS are made by men who make nothing but motors—who, by doing the same thing over and over have become masters in perfection. That is why we can make truck motors better, quicker, and at less cost than the truck manufacturer himself.

We make truck motors of all sizes, for all requirements. No matter whether you are building a 1,500 pound light delivery wagon or a 5-ton truck, we can meet your demands for power, economy and dependability.

Do not determine on a motor for your truck till you have sent us your specifications

BEAVER MFG. COMPANY

Milwaukee Wisconsin



Throughout the United States

the unprecedented increase in all kinds of business has confronted merchants with delivery problems which must be solved. Their delivery zones must be enlarged and delivery efficiency and delivery economy must go together.

The answer to the problem is the

Commerce Truck

THIS CHASSIS OF 1500 LBS. CAPACITY with standardized component parts meets the gasoline situation fairly by giving the greatest mileage per gallon of any commercial vehicle of equal capacity. The first cost is low and the upkeep expense is very little, owing to the simplicity and quality of material and workmanship.

To truck dealers this line offers exceptional opportunities for large sales at this period of big business. Those who own Commerce Trucks will buy more and many who have relied on horse-drawn vehicles will now be in the market for motor trucks.

DEALERS send today for our proposition. Get specifications of our chassis and line of bodies. There's a big field for you. The time to coin money and build up your business is now—the vehicle to do it with is the Commerce Truck.

Commerce Motor Car Co., Detroit, Mich.

W. H. BRINKERHOFF, Eastern Representative
12 Belmont Ave., Elmhurst, Long Island, New York



DON'T

throw your old bearings away just because they are worn or broken.

We regrind the raceways (without drawing the temper) insert new balls and retainer AT about one-fifth the cost of a new bearing.

Any broken or worn bearing can be exchanged at any of our service stations, for reground bearings of any type or make, which are guaranteed equal to new.

These stations also carry complete stocks of New Single Row Annular, Thrust, NEW DOUBLE Row and Radax Bearings.

Write for Catalogue "U" and further information

Ahlberg Bearing Company

2636 Michigan Avenue Chicago, Ill.

BRANCHES

New York, 1790 Broadway — Cleveland, 1841 Euclid Ave.
Boston, 93 Massachusetts Ave. — St. Louis, 2831 Locust St.
Detroit, 790 Woodward Ave. — Los Angeles, 325 W. Pico St.
Minneapolis, 926 Marquette Ave.

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NORTH AMERICAN MOTORS

4-⅜ in. x 6 in.—45 H. P.—1200 R. P. M.

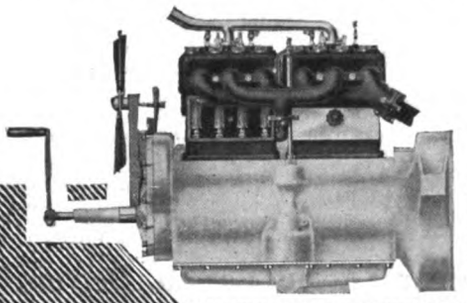
Expressly Designed to Take Care of the Most Exacting Conditions in Truck Service

Model N is a Long-Stroke Motor with a Tenacious Pulling Power—the very essential demanded by successful builders of motor trucks.

Rich with such features as Timing Shaft driven by Silent Chain, Speed Governor, Valves all on one side, enclosed and easily accessible by removable plates, and intake and exhaust manifolds on one side, with magneto on opposite side, removed from heat of exhaust manifold.

There are other good reasons why you should use the North American Motor. Let us tell you about them and quote prices.

North American Motor Co., Pottstown, Pa.



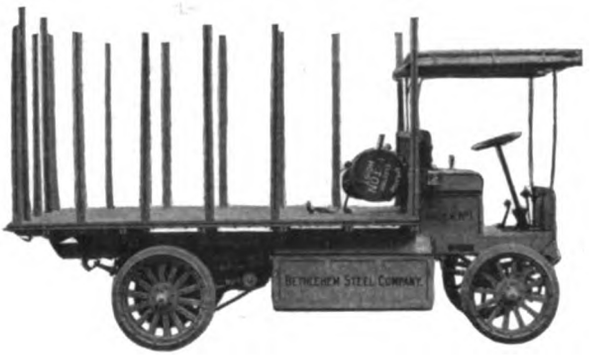
The Long Distance Electric

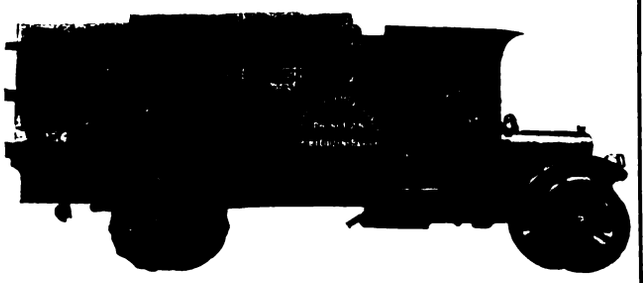
In all problems of heavy service electricity is the most dependable, economical, and satisfactory power. Atlantic Electric Trucks are built in ½, 1, 2, 3½ and 5-ton models. Guaranteed to give 15% more mileage than any other electric truck of equal capacity and same equipment.

Hundreds of users unhesitatingly endorse the known superiority of Atlantic Long Distance Electric Trucks. Our new models have every proven safety factor in construction; modern steering apparatus, allowing driver extreme latitude and flexibility in traffic, maximum traction, smoother rolling, scientific load suspension, etc. Every truck carries with it a guarantee of faithful performance, adequate service, and mileage plus beyond your requirements.

The experience of our experts in handling delivery problems will be of value to you. Let us know your requirements. Our recommendations entails no obligation.

Atlantic Electric Vehicle Co.
Vanderbilt Bldg., New York
Main Office and Factory, Newark, New Jersey





Gary Worm Drive Trucks

were designed to give the greatest possible service at the least possible cost.

To accomplish this the most skillful designing, the best materials, most expert workmanship and thoroughly proven standardized parts have been combined to produce a truck that is the last word to date in efficiency, economy and reliability. It is the type of truck which keen buyers are demanding and has stood their most critical inspection with the result that over 50% of our business is repeat orders from Gary Truck owners.

Our price is right. We have something interesting to say to you—write for it. Don't delay.

THE GARY MOTOR TRUCK CO.
610 BROADWAY GARY, INDIANA

By Jingo!— That's Real Service

said one of our customers.

Yes! and we can give *your* felt orders the same prompt attention if you'll let us.

Why not try doing business with an A-1 house and get "what you want when you want it"?

Dependable goods only; accuracy in manufacture, prompt service and attractive prices are the watchwords of our business.

"If it's made of felt, ask Booth"

Write—Wire or Phone

The Booth Felt Co., Inc.

440-450 Nineteenth St., Brooklyn, N. Y.
116-118 South Fifth Ave., Chicago, Ill.
12th St. and Grand Trunk R. R., Detroit, Mich., 'Phone, Market 5804

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BOSSERT



Progress in Designing



There are many parts used in the building of trucks which would give better results if pressed steel parts were substituted for malleable iron, steel castings or drop forgings.

Pressed steel parts will assist in reducing the weight of a truck, while maintaining the strength of the parts so made, at an advantageous cost of manufacture.

"The Bossert Way"

In the most modern plant which brains, money and experience can devise we make more than 200 pressed steel parts. Let us show you the advantage of Pressed Steel Spring Hangers, Running Boards, Brake Drums and a score of other truck parts.

The Bossert Co.



UTICA, N. Y.

Sterling TRUCKS

THIS complete line of worm gear driven trucks affords the dealer an unusually profitable opportunity. Write for open territory.

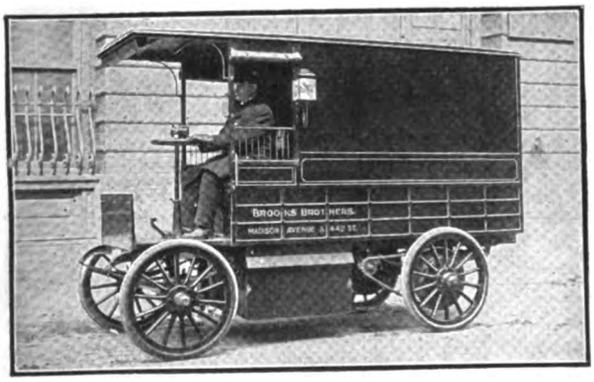
STERLING MOTOR TRUCK CO.

838 Rogers Street Milwaukee, Wis.



G. V. ELECTRIC TRUCKS

SIX MODELS: 1,000 POUNDS TO 5 TONS



Nearly 5,000 in use
Catalog on request

General Vehicle Company, Inc.

GENERAL OFFICE AND FACTORY
LONG ISLAND CITY, NEW YORK

NEW YORK::CHICAGO::BOSTON::PHILADELPHIA

1664

$350 and a FORD gives you this guaranteed 1-Ton Truck



In other words, for less than half the price, you get equal carrying capacity and efficiency to trucks costing $1500 or more, coupled with FORD DEPENDABILITY, DURABILITY AND UPKEEP ECONOMY.

Here's the TRUCK everybody wants, same as the Ford is the universal car. Think of the opportunity for sales in your city on the truck that GIVES THE CHEAPEST DELIVERY COST IN THE WORLD.

For full particulars about the wonderful Smith Form-a-Truck Attachment that instantly makes a guaranteed one ton truck of any Ford, and for OUR GREAT EXCLUSIVE DEALER'S PROPOSITION, address

Smith FORM-A-TRUCK CO.

Suite 911, Smith Form-A-Truck Building
1470 Michigan Avenue
CHICAGO ILLINOIS

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Under Control

Jail should await the truck owner who does not know that the linings of his brakes are in perfect condition.

A heavy truck with bad brakes is a lawless menace.

Thermoid
HYDRAULIC COMPRESSED
Brake Lining-100%

100% because it's brake lining clear through, not merely on the surface. It will hold though worn paper thin.

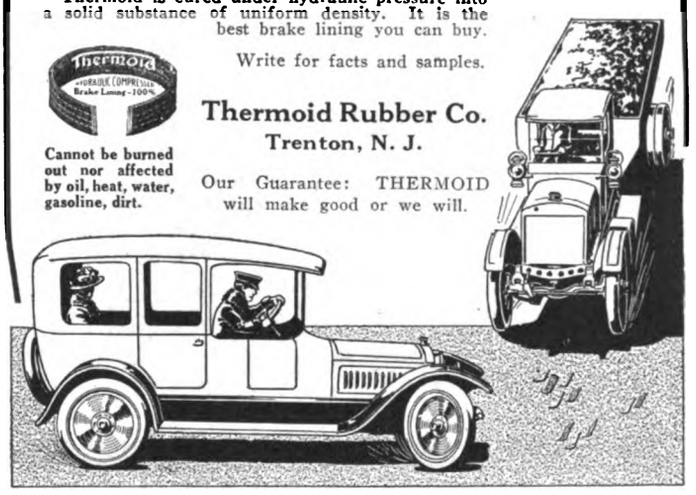
Thermoid is cured under hydraulic pressure into a solid substance of uniform density. It is the best brake lining you can buy.

Write for facts and samples.

Thermoid Rubber Co.
Trenton, N. J.

Cannot be burned out nor affected by oil, heat, water, gasoline, dirt.

Our Guarantee: THERMOID will make good or we will.



M&S DIFFERENTIAL

ANNOUNCING the completion of a new factory for the exclusive manufacture of M & S differentials.

The keenly felt need for a POSITIVE DRIVE DIFFERENTIAL can now be met by progressive truck builders, feeling assured of the highest possible perfection under ideal manufacturing conditions.

The success of the M & S on the Jeffery Quad and the overwhelming evidence of severest tests long since established "the differential that pulls both wheels" as the ideal one for commercial motor vehicles.

Write for interview or send in your specifications.

M & S GEAR COMPANY
166 Lycaste Street
DETROIT

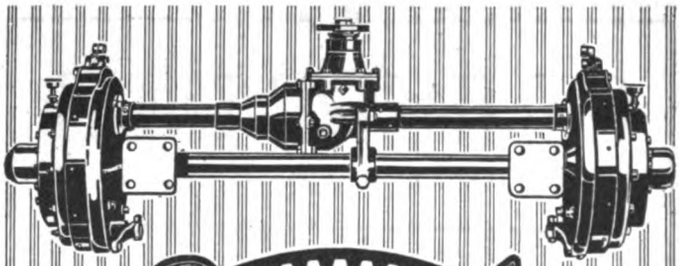
15 Years of Truck Success



TRUCK ECONOMY is best explained by the records of Gramm-Bernstein Trucks. Many have traveled 50,000 miles, carrying loads, without one cent of repair expense. That's the reason the Gramm-Bernstein truck pays for itself in less than a year. Learn about these Gramm-Bernstein features—they mean truck dependability plus economy for you.

Ask for catalog No. 13

The Gramm-Bernstein Co.
Lima, Ohio



Russel
Internal Gear Drive Axles

SELLING trucks these days is not difficult, for the industries of the country are awakening to the advantages of motorized delivery.

Make your sales even easier by using trucks driven by the Russel Internal Gear Drive Axle.

Industrial preparedness demands that the most serviceable, durable and efficient form of truck haulage be adopted by you.

Adopt, therefore, a truck using The Russel Internal Gear Drive Axle

Russel Motor Axle Co., North Detroit

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"Little Giant"

The Truck for All America



—for eight long years Little Giants have proved themselves—their big efficiency—solid service—real economy. They are backed by every dollar of the more than $11,000,000 capital and resources of Chicago Pneumatic Tool Company—a twenty-two-year-old concern with 25,000 active customers—eight great factories in this country and abroad—branch houses, agencies and service stations almost everywhere.

Write for Booklet—Mailed on Request

"Making Deliveries Deliver Profits"

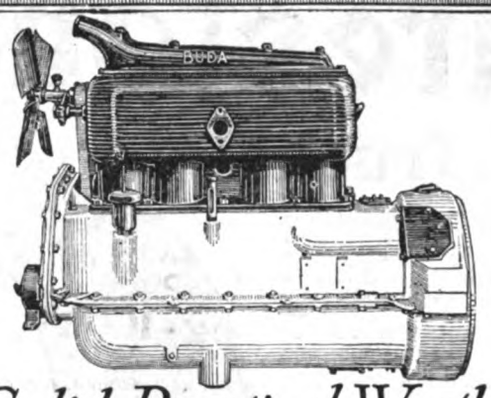
Dealers:—Write for interesting proposition

CHICAGO PNEUMATIC TOOL COMPANY

Dept. P., 1615 Michigan Ave., Chicago
239 West 50th St., New York

THE LITTLE GIANT LINE

Model 15—1-ton Worm Drive, Chassis Price.....$1500
Model H—1-ton Chain Drive, Chassis Price.....$1400
Model H—1½-ton Chain Drive. Chassis Price.....$1500
Model 16—2-ton Worm Drive, Chassis Price.....$2500



Solid, Practical Worth

in the highest possible degree is the goal successfully attained by the,

BUDA TRUCK MOTOR

Truck value is practically determined by the efficiency and durability of the motor. The value of *your* trucks should be insured by the 35 years of manufacturing integrity which stands behind the Buda Motor.

The BUDA COMPANY
HARVEY CHICAGO SUBURB ILLINOIS

Models for all trucks.

THE BUDA COMPANY BUDA MOTOR The part to buy the car by ESTABLISHED 1881

Models for all cars, too.

Garford

Garford Trucks range from 1500 pounds to six tons in capacity.

They are designed and built by men who have spent their lives in the study of motor trucks.

They are backed by one of the strongest organizations in the industry.

Bodies are provided to meet all requirements.

Write for catalog. Please address Dept. 103

The Garford Motor Truck Co., Lima, O.

United States 'Solid Truck' Tires



The Lighest in the World—and the Most Durable

It is a fact—curious, perhaps—but a FACT, none the less, that the better the rubber compound used in a Solid Motor Truck Tire, the lighter that tire will be.

Volume for volume, size for size, United States Solid Truck Tires are the lightest now manufactured.

By the same token, they are the most durable—Witness the testimoney of hundreds of satisfied users.

United States Tire Company

1790 Broadway New York

UNITED STATES RUBBER COMPANY US RUBBER SYSTEM AND ASSOCIATED COMPANIES

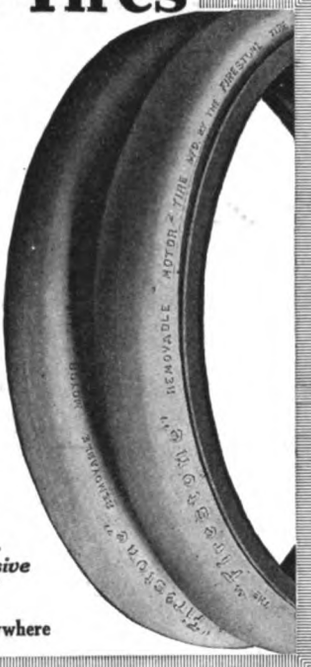
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Firestone

Truck Tires

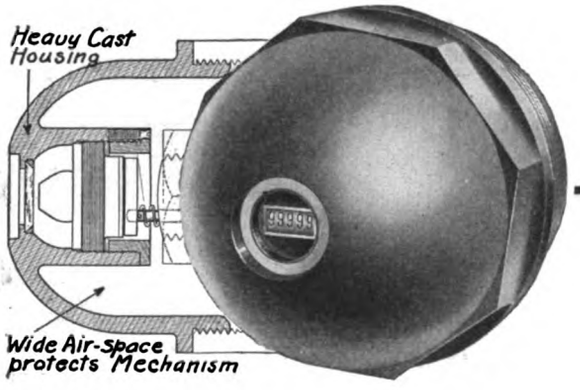
Every Firestone is a masterpiece of Toughness and Resiliency, and the right tire for its work. Firestone S.A.E. Removable Rim Equipment enables any driver to change tires in a few minutes. No delays. No truck layoffs.

Firestone Pressed-on Type applied under tremendous pressure. Light weight with great strength. Call the Firestone station near you for details and low prices.



Firestone Tire and Rubber Co.
"America's Largest Exclusive Tire and Rim Makers"
Akron, Ohio
Branches and Dealers Everywhere





Always working

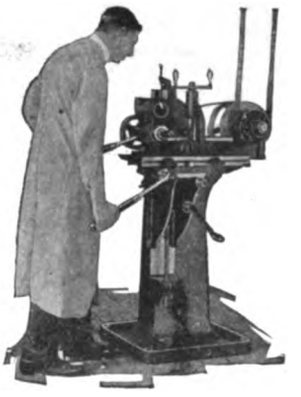
Keep a daily mileage record with a hub odometer that can't be broken—that is always working, always reliable.

DREADNOUGHT *Indestructible* Hub Odometer

is protected by a heavy cast housing. Guaranteed indestructible—if you break it, we'll replace it free. Easy to read—figures always right-side up—can't be obscured by grease or dust.

Send for booklet and prices.

AMERICAN TAXIMETER COMPANY
Mfrs. of Jones and Popp Taximeters
1765 Broadway New York



Here's What You Need in Your Garage or Repair Shop

because it is an all around machine and has features that make it a necessary tool for your line of work.

The "Whitney" Hand Miller

will cut gears, cams, sprockets, do key seating, profiling, slotting, slabbing, straddle milling, and hundreds of other operations.

Our Universal Milling Attachment permits the use of end mills and makes the machine desirable for drilling and all classes of milling where small cutters and high speeds are necessary.

Simply drop a postal for our Miller Bulletin.

The Whitney Mfg. Co. Hartford, Conn.

Chains—Keys—Hand Milling Machines.

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Stegeman

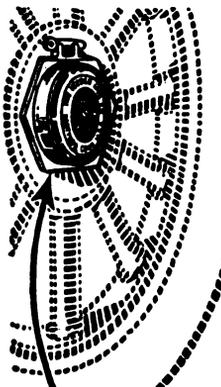


SIX-CYLINDER TRUCKS

Strength to withstand abnormal usage is built into every Stegeman truck. Our machine has been tried and proved by 7 years of success—the first Stegeman is still on the job.

Electric-starters and electric lights are standard equipment on Stegeman trucks—they are not charged for. Our list-prices are low, making our line a fast-selling proposition. Write for the agency.

Stegeman Motor Car Company
Milwaukee Wisconsin



TIRES

The manufacturers of *good* tires suggest that you keep odometer records of mileage. And the accuracy of the

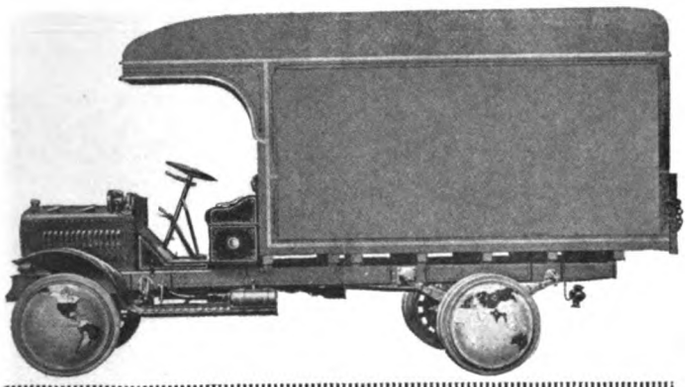
Veeder Hub Odometer

has made it accepted as the standard. It gives you the actual miles traveled by your car—and *accurately.*

Check up your upkeep costs with a Veeder Hub Odometer. Price complete $20. Special model for Ford cars $15.

Cyclometers for Bicycles and Motorcycles. Odometers for Automobile and Horse Drawn Vehicles. Counters for practically every purpose. Tachometers, Tachodometers and Fine Die Castings.

Veeder Mfg. Co.
54 Sargeant Street Hartford, Conn



WICHITA TRUCKS

Dependability Plus Extensive Service

ARE YOU THE DEALER

who can put into your salesmanship WICHITA Energy and Spirit and back up your selling accomplishments with WICHITA Service?

If you are such a dealer, we have an interesting selling plan that you will not want to miss considering.

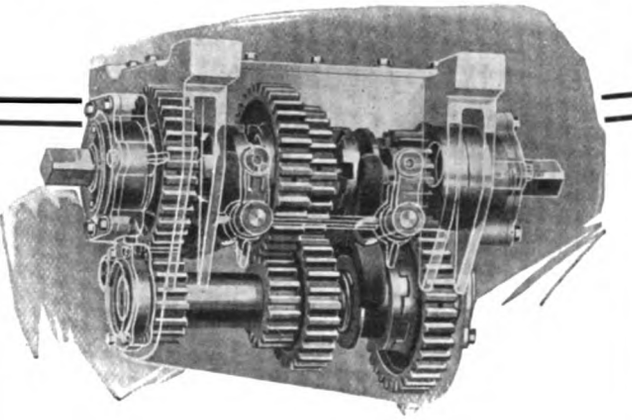
The faithful co-operation of our factory organization will give you encouraging help.

We want live dealers NOW—Men who will interest concerns in our heavy-duty trucks, and then to not let up on them until they sell them.

Request us to immediately submit our plans.

WICHITA FALLS MOTOR COMPANY
Arthur Boulevard, Wichita Falls, Texas

Cotta Transmission For All Commercial and Pleasure Cars



The construction of this unique transmission prevents engagement of two speeds at the same time, and, regardless of speed, facilitates shifting of gears.

All gears are always in mesh. There are no plain bearings. Gears that at times run idle are mounted on roller bearings.

Cotta Transmission Co.
814-18 S. Main St., Rockford, Ill.

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Mack
TRUCKS

TO MOTOR TRUCK USERS

DURING the six months ending June 30th, our truck sales for home consumption have exceeded those for the entire year of 1915. This is exclusive of the many export orders which were filled during those periods.

That we were able to better our 1915 record and *in six months double* our domestic sales, is convincing evidence of the *success of our new models*.

Public endorsement of MACK A B and A C Models continues, as is shown by the large number of repeat-orders received during the month of June, and still further evidenced by a rapidly growing list of new customers.

These sales, made in the face of strong competition, demonstrate convincingly the superiority of the MACK line.

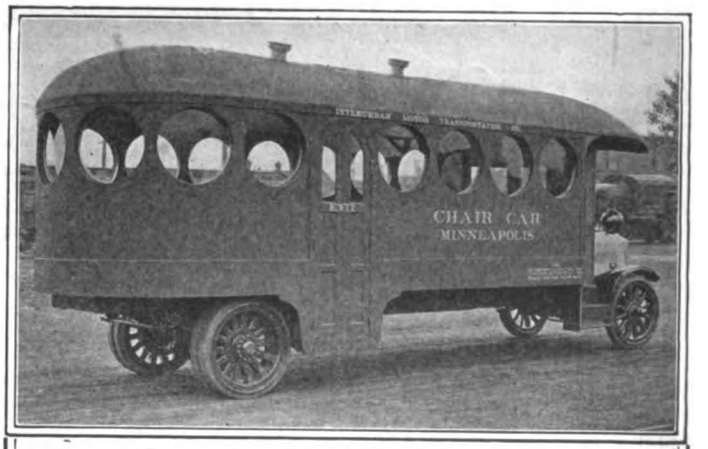
International Motor Company
64th St. & West End Ave. New York City

BROWN-LIPE

transmissions and differentials represent the maximum from a standpoint of effiency and durability.

BROWN-LIPE GEAR CO.
SYRACUSE, N. Y., U. S. A.
BROWN-LIPE CHAPIN CO.
Differentials Transmissions

NEW YORK—Thos. J. Wetzel, 29 West 42d St.
SAN FRANCISCO—A. H. Coates, 444 Market St.
CHICAGO—K. Franklin Peterson, 122 So. Michigan Ave.
DETROIT—L. D. Bolton, 2215 Dime Savings Bank Bldg.
Foreign Agent, Benjamin Whittaker, 2, Norfolk Street, Strand, London, W. C.



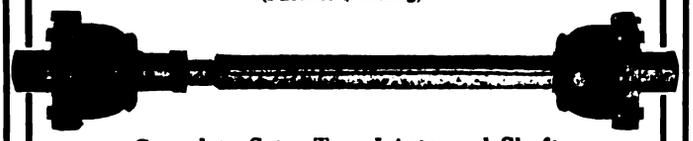
HIGHWAY COACH
"Parlor Car"
27 Individual Chairs
(Combination spring-air cushioned standards)
All the comforts and fascination of rail travel
"Pullman" Cars at Bus Prices

McKEEN MOTOR CAR COMPANY
OMAHA, NEB.
(Builders of the famous "McKeen" Railroad Gasoline Motor Cars)
Flanged wheels for railroad service
Body order specialists

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"EVANS" UNIVERSAL JOINTS

(Patents Pending)



Complete Set. Two Joints and Shaft

Compact, Durable and Powerful Self-Contained, Simple, Neat and Easy to Disassemble

Made in Four Sizes—up to 100 H.P. Shafts up to 2½" Diameter. Angle of Drive—up to 15°. Send for Data and Prices. Reasonable Deliveries

Also—"Hele-Shaw" Clutches—"M. & E." Grease Cups

Manufactured Exclusively by

MERCHANT & EVANS CO.

PHILADELPHIA

New York
Baltimore
Cleveland

Wheeling
Chicago
Kansas City

NUTTALL TRACTOR GEARS

The tractor is the Farmer's motor truck.

Its service to him is measured by the same standards that the merchant applies to his truck—efficiency in service.

And there are just two elements to that efficiency—the engine and the gears.

Too many manufacturers put all the burden on the engine.

Let us tell you the relation between Nuttall Gears and the Engine.

Tractor Gear Dept.

Nuttall - Pittsburgh

2-Ton Worm Drive ACME Chassis equipped, $2100
1-Ton Worm Drive ACME Chassis equipped, $1500



SALES—SPEED!

Acme Dealers Get Quick Business!

Dealers! If you want to get truck prospects "up-and-coming," introduce ACME 1-Ton and 2-Ton Worm Drive Trucks, $1500 and $2100, to your territory.

Speed up sales! ACME "Proved Units" prejudice the buyer in ***your favor***—

Continental Motor	Warner Clutch	Rayfield Carburetor
Timken Worm Drive	Warner Transmission	Gemmer Steering Gear
Timken Front Axle	Detroit Springs	Smith Pressed Steel Frame
Timken Rear Axle	Long Radiator	Pierce Governor
Timken Bearings	Eisemann Magneto	Stewart Vacuum System

Write for Territory!

This agency will win a splendid clientele. ACME superiorities sell ACMES—bring ***repeats.***

Here's ***built-in service*** your prospect can see before purchase. Strong local advertising and sales co-operation to build your business. Write today for attractive particulars and territorial offer.

Cadillac Auto Truck Company

18 Mitchell Street

CADILLAC, MICHIGAN

CADILLAC AUTO TRUCK COMPANY
18 Mitchell St.
Cadillac, Mich.

Please supply complete information about the ACME 2 Ton and 1 Ton Trucks and Blank Agency Contract, with full details of your attractive offer for progressive representation in this territory.

Firm Name.....
Individual Name.....
Address .....
Town ..... State.....
Present Agent for.....

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In the Preparedness run from Fort Miley, San Francisco, to Halfmoon Bay, recently made by the Thirteenth Company, Coast Artillery, U. S. A.

NEW DEPARTURE BALL BEARINGS

American Made for American Trade

played their silent part

The Saurer truck which hauled the four and one-half ton howitzer on this trip, in record time, was equipped with New Departures.

While the demonstration thus made is of more than passing interest as a demonstration of motor truck efficiency, the great truth to be conveyed is, that this five-ton truck, its big and little brothers, which daily do their part of the world's work in peace and war, are rendered lastingly efficient by the installation of New Departure Ball Bearings.



The New Departure Manufacturing Co.
Bristol, Conn., U. S. A.
Conrad Patent Licensee
Western Branch: 818-20 Ford Bldg., Detroit.
Distributors in Trade Centers Throughout the United States.
British Agents: Brown Bros., Ltd., London, E. C.
For Continental Europe: Jacob Holst, Copenhagen.

When a Man Buys a Truck

the first thing he wants to know is what kind of a motor it's got. He wants to be sure first of all of the power plant. He wants a motor with a record behind it, a motor that other truck owners have tested out for him, that they have found stands up to the grind of hard, gruelling work day in and day out, year in and year out.

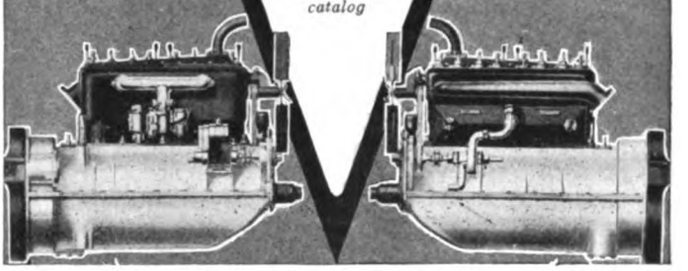
Wisconsin CONSISTENT **Motors**

have won their high standing because of the service they have given. They are durable, economical, dependable.

Wisconsin Motor Mfg. Co.
Station A, Dept. 319
Milwaukee, Wisconsin

Write now for special catalog

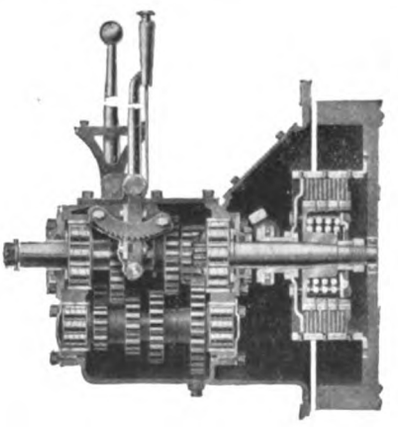
Type T-U
4 in. bore,
6 in. stroke
Intake View



Type U-U
4¼ in. bore,
6 in. stroke
Exhaust View

COVERT COVERT COVERT

TRANSMISSIONS



Made in various models for different sizes and types of cars—Covert Transmissions will free you from transmission troubles. Let us show you how they fit your construction.

Covert Motor Vehicle Co.

Sales Office, Detroit, Mich.
Factory, Lockport, N. Y.

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Meet Your Motor Half Way!

Any good motor will give you what you want if you give it what it needs.

Not one of its needs is more vitally important than a sure, dependable, red-hot spark—the kind that guarantees complete, rapid combustion—the kind the motor always gets, at any speed, from the

EISEMANN MAGNETO

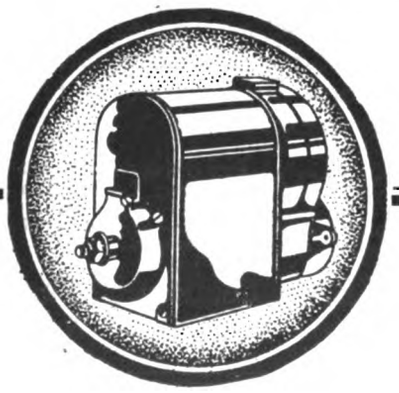
The test of a Magneto is its low speed efficiency—the quick pick-up, the responsiveness of the motor. The superiority of Eisemann Ignition is as apparent at low speed as at high.

Durable
Dependable
Powerful

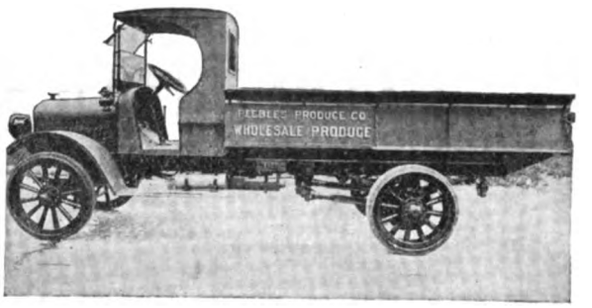
EISEMANN MAGNETOS are made in a range of types and sizes to meet every requirement of gas or gasoline engines.

THE EISEMANN MAGNETO CO.

Sales and General Offices:
32-33rd Street, Brooklyn, N. Y.
Indianapolis, Ind., 415-417 N. Capitol Ave.
Detroit, Mich., 802 Woodward Ave.



Type G-4



$1875 Buys a NILES two-ton Chassis complete, except body. If this Truck were sold thru a dealer, it would cost you not less than $2500.

$1175 Buys a NILES three-qtr. to one-ton Chassis. Thru a dealer about $1500.

Niles Motor Trucks are sold "DIRECT TO THE USER" and no middleman receives a profit on same. Isn't this fair to the purchaser?

Further, Niles Trucks are not sold at cut prices, no discounts are allowed. Every man's dollar has the same purchasing power on a Niles Truck. We do not inflate its value with a high list price, and then reduce the value by offering variable discounts to fit each purchaser's pocket book.

Second Hand Trucks or other articles are not taken in trade as part payment on Niles Trucks. Write us why we adopted this policy. It's interesting.

Service means taking care of the Truck after its delivery. Keeping it running every day at the lowest possible cost. How can we do this without dealers? Well, we are doing it, and satisfactory to Niles users too. A postal card to us will bring back the proof.

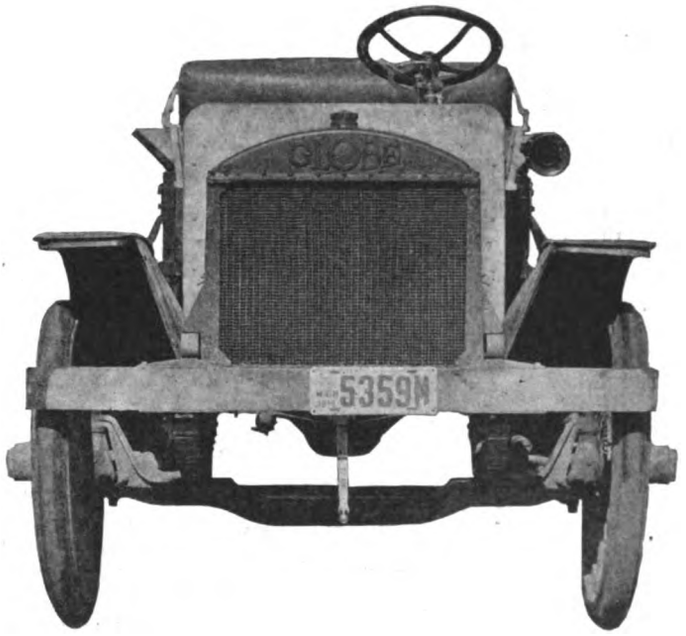
Quality is consistent thruout Niles construction. Better parts cannot be purchased than we use, and the parts we manufacture are consistent with those we purchase. High grade workmanship and interchangeability are assured

WRITE FOR OUR LITERATURE

The Niles Car & Manufacturing Co.
Niles, Ohio, U. S. A.

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The
GLOBE TRUCK
6 Cyl. 1-Ton



The Globe Six Truck has

Greater Pulling Power
Greater Flexibility
Greater Mileage per gallon of gas
Extreme Quietness
Extreme Lack of Vibration
Standard Parts Thruout
and is a quality truck in every way.

Mr. Dealer, are you alive? Write for distributing proposition at once.

Globe Motor Truck Co.
Northville, Mich.

SELDEN TRUCKS

Dealers can afford to wait for our new announcement and attractive selling proposition.

A full line of Commercial Vehicles from a 1500 lb. Delivery Car to a 3½ ton Truck.

All Ready by September

SELDEN TRUCK SALES CO.
Rochester, N. Y.

Krebs

"The Truck That Thinks"

The ideal commercial truck possesses four essentials — Simplicity — Low Maintenance Cost—High Efficiency and Absolute Dependability—That's the KREBS.

It is powerful, economical and needs no mechanic to drive it. The driver has nothing to do but steer.

The KREBS Automatic Governor positively keeps the motor at a certain speed and is assurance against the results of reckless driving.

Continental Motor, Timken Axles, Special economical KREBS Carburetor, Timken-Brown Worm Drive — are a few of the important essentials.

In ¾, 1, 2, 3, and 3½ ton capacities with bodies for any business.

Send for catalog—it will show you why you need the KREBS —the most efficient truck in the world.

The Krebs Commercial Car Co.
CLYDE, OHIO, U. S. A.

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When others give way

GOODRICH DE LUXE TRUCK TIRES

Made in 5 in., 6 in. and 7 in. widths

prove their superior mileage and service-giving ability

—Ore from the richest magnesite mines in America are hauled by a fleet of motor trucks from the interior to the railroad at Livermore, Cal., a distance of 35 miles.

And on these trucks, Goodrich Tires form the major all-around equipment. It is because they *make records* for continuous, long wearing service under the most trying road conditions. Half of the distance is over rough mountain roads—very rutty, with sharp turns and steep grades.

—Some tires on this grueling run invariably give out after a few thousand miles. Some less than that. Goodrich DeLuxe give mileages of from 7,000 to 15,000 miles.

Write for Catalog

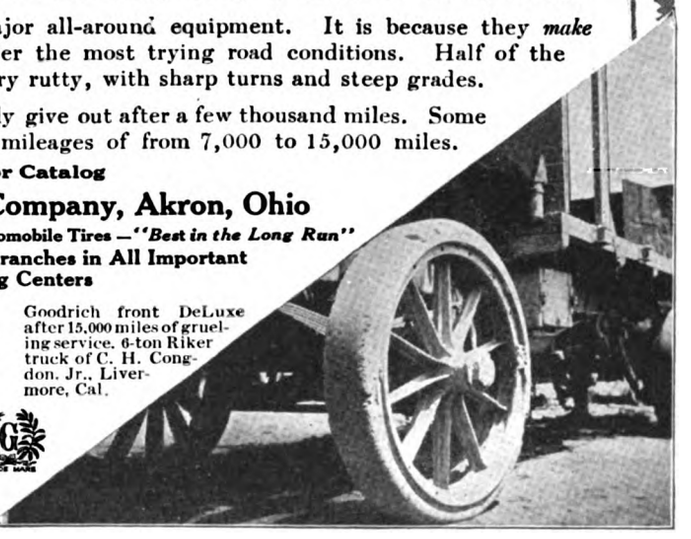
The B. F. Goodrich Company, Akron, Ohio

Makers of the Celebrated Goodrich Automobile Tires—*"Best in the Long Run"*

Service Stations and Branches in All Important Trucking Centers



One of the Packards hauling ore from the mines to Livermore. Goodrich Tires making good on these narrow mountain roads.



Goodrich front DeLuxe after 15,000 miles of grueling service. 6-ton Riker truck of C. H. Congdon, Jr., Livermore, Cal.



A STYLE FOR EVERY BUSINESS

International Motor Trucks, in three sizes, 1000, 1500 and 2000 lbs. capacity, are now furnished in styles to meet the needs of every business. Two or four cylinder motors; chain drive, or shaft; solid tires or pneumatic; high wheels for country road driving or low wheels for work on city streets; any desired style or size of body—all the advantages which a great organization gives are at the service of International Motor Truck purchasers.

New Models—Attractive Prices

M—1000 lbs. capacity, complete with express body	**$710**
E—1500 lbs. capacity, complete with express body	**950**
H—1500 lbs. capacity, internal gear drive (chassis)	**1225**
F—2000 lbs. capacity, internal gear drive (chassis)	**1500**

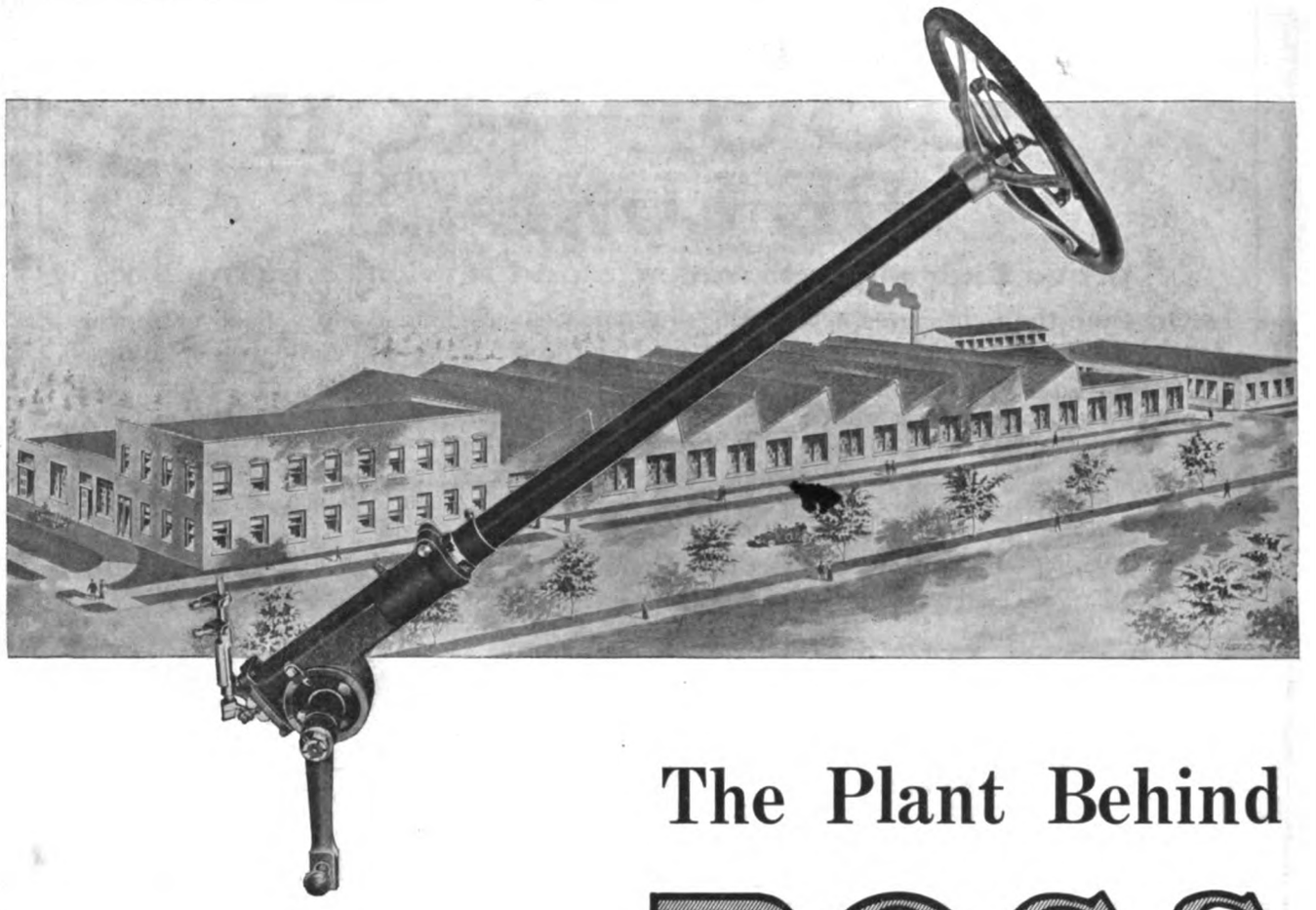
Any model can be equipped with pneumatic tires for $50 more than the above prices. All prices are cash f.o.b. factory.

International Motor Trucks may be seen at any one of the 87 completely equipped service branches scattered throughout the United States. This network of gratifying service has contributed not a little to the popularity and success of the International. Write for catalogue and any special information you may desire.

INTERNATIONAL HARVESTER COMPANY OF AMERICA

155 Harvester Building (INCORPORATED) **Chicago U S A**

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The Plant Behind

ROSS GEARS

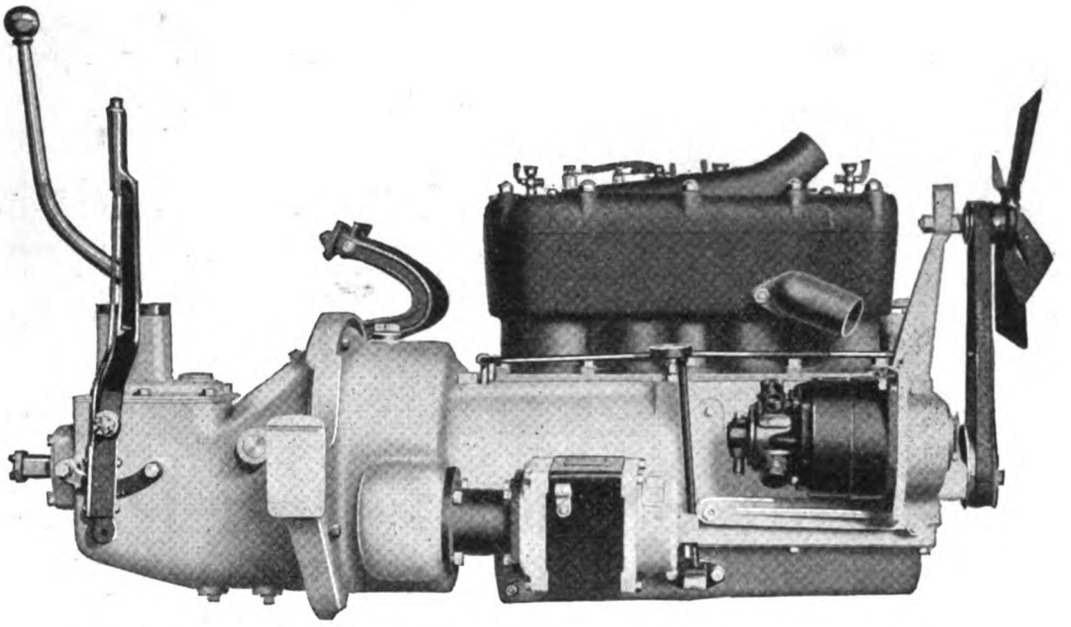
"the steering gears which predominate on motor trucks," is the last word in modern construction. Its superlative equipment aids us in affording our customers a service unsurpassed for prompt deliveries.

Ross Gear & Tool Co.
750 Heath Street LaFayette, Ind.

PLEASE MENTION THE COMMERCIAL VEHICLE WHEN WRITING TO ADVERTISERS

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It Stands Up



G·B&S motor

MANUFACTURERS of automobiles who use the G. B. & S. motor find that it stands up in service and makes friends for their product. There is plenty of evidence available to prove this.

The motor is the point of contact between car and driver. What the *motor* is, the *car* is, in the mind of the user. That means quality, first, last and all the time.

Another way of saying it is: The automobile is no greater than its motor.

There is a marked tendency, observed and commented on by laity and trade alike, toward highly developed four-cylinder motors. The development of the "four" is nothing short of marvelous.

Just a few days ago the head of a big corporation manufacturing both "fours" and "sixes" remarked that there was as much call for one as for the other.

And he expressed his conviction that a good four was equal to any six—and better than many sixes!

You want flexibility, balance, power, economy, quietness and endurance in a motor—and that is exactly what you get in this G. B. & S. motor.

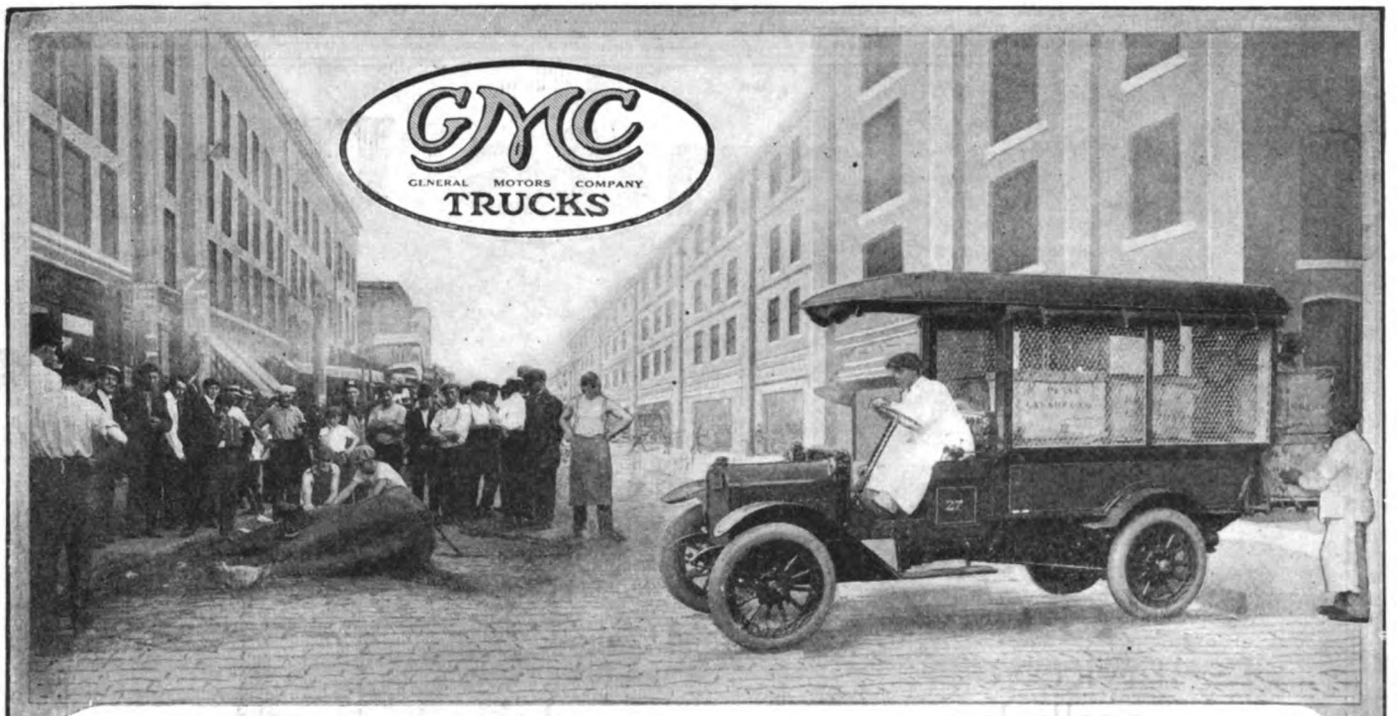
We build this one type of motor exclusively. Concentration and specialization mean the utmost in value and service for the money.

Our prices, our deliveries and our quality demand your interest. Write for further facts.

Golden, Belknap & Swartz Co.

Detroit, Mich.

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Make Your Haulage Heat-Proof

Today good business demands that you insure your haulage against heat. Hot weather is no longer an excuse for late deliveries nor deferred shipments. It's too well known that sweltering days can't cripple the modern motor truck.

And it makes no difference whether you are operating a retail store requiring the delivery of frequent light loads, whether you supply contractors with heavy materials, or have tons of freight to haul over the mountains. You can come with confidence to "truck headquarters" for a truck to fit your business. In fact, no matter what the character of your work, if you have loads of from 1500 lbs. to 5 tons to haul on city streets or country roads, there is a *GMC* truck that will serve you economically and well.

GMC trucks are built in both *worm* and *chain* drive. You can choose according to your preference, or we will give you the benefit of our experience in helping you select the type best suited to your particular service. Business men in more than 200 different lines have availed themselves of this experience with highly satisfactory results.

We do not claim to make the *only* trucks that do satisfactory work. But we do believe that there are more good features combined in *GMC* trucks than in any other one make.

And *GMC* trucks are neither the highest priced nor the lowest priced trucks. We are convinced, however, that including purchase price, upkeep expense and operating cost, *GMC* trucks will show the lowest cost per ton mile per annum over a period of years.

Before you invest in any motor trucks, give us an opportunity to show you *why* we believe these things —then you will be better satisfied with whatever trucks you buy.

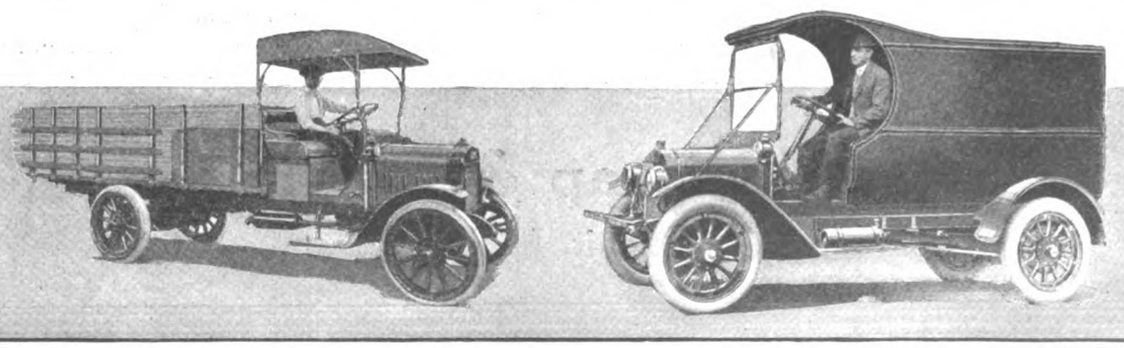
GENERAL MOTORS TRUCK COMPANY

One of the Units of General Motor Company

PONTIAC, MICHIGAN

Direct Factory Branches: *New York, Boston, Chicago, Philadelphia, St. Louis*

(91)



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The Safest Brake Lining For You to Sell

The Brake Lining that affords the highest degree of safety to the user—that reduces the mileage service cost to the minimum through an exceptionally long term of dependable service—is the safest brake lining for you to sell. In the highest degree these conditions are met by

GARCO
ASBESTOS BRAKE LINING

GARCO Asbestos Brake Lining through each step of its manufacture must meet standards that guarantee the highest quality in the finished product. It is solidly woven—heavily re-enforced with brass wire. GARCO will not heat or burn; the solution with which it is impregnated fully protects it from the action of water, oil, grease or dirt. **GARCO resists wear.**

Your jobber has GARCO Asbestos Brake Lining in stock. The next time you are in the market insist that he supply you. GARCO literature will give you valuable information on the Brake Lining Business. It will be gladly sent you on request. Write us today.

TRADE ARCO MARK

GENERAL ASBESTOS & RUBBER COMPANY

Main Offices and Factories CHARLESTON, S. C.

Branch Offices at #58 Warren St., New York; #312 1st Ave., Pittsburgh; #530 Golden Gate Ave., San Francisco

We manufacture a special type lining for Ford Transmission Bands, put up in rolls and complete sets with rivets. Also a full line of Asbestos Automobile Specialties.

TRADE ARCO MARK

GARCO GARCO GARCO GARCO

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BAUSH

WORM DRIVE



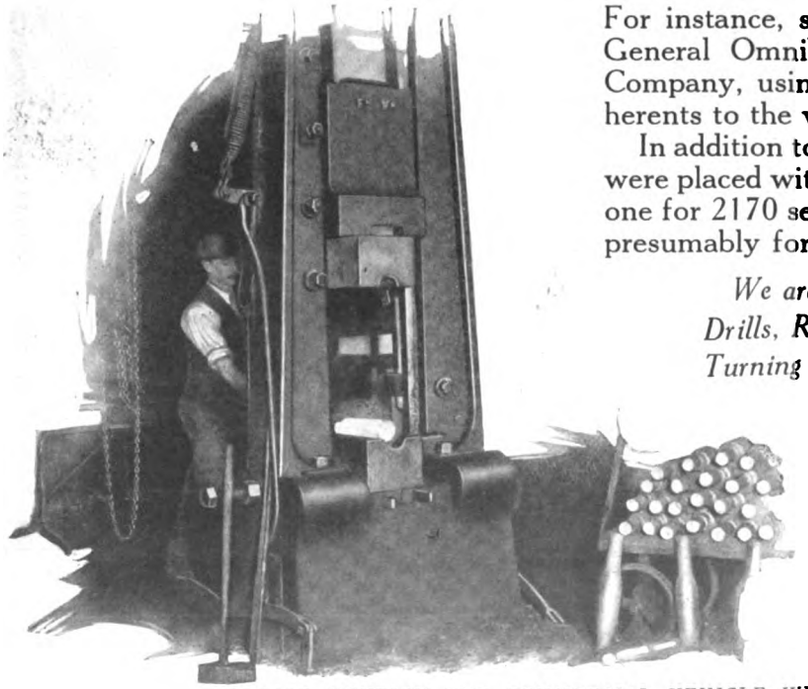
Ninety-one Truck makers Use Worm Drive

From nothing to over 50% in three years

NOT only are worm gear driven trucks rapidly replacing all other types of drive in this country, but abroad, after many more years of usage than they have enjoyed in this country, the percentage increase is still in favor of the worm, and is growing. Even under war conditions, when the European countries were glad to get anything that rolled, the output of worm gears has maintained its dominant position.

It is interesting to note also that not only have the individual truck makers shown their preference for worm drive the world over, but the most prominent users of trucks have verified the judgment of the manufacturers. For instance, such traffic concerns as the London General Omnibus and the Fifth Avenue Coach Company, using thousands of trucks, are firm adherents to the worm drive.

In addition to this situation, two enormous orders were placed within the past few weeks from France, one for 2170 sets of worms and another for 3500—presumably for Governmental use.

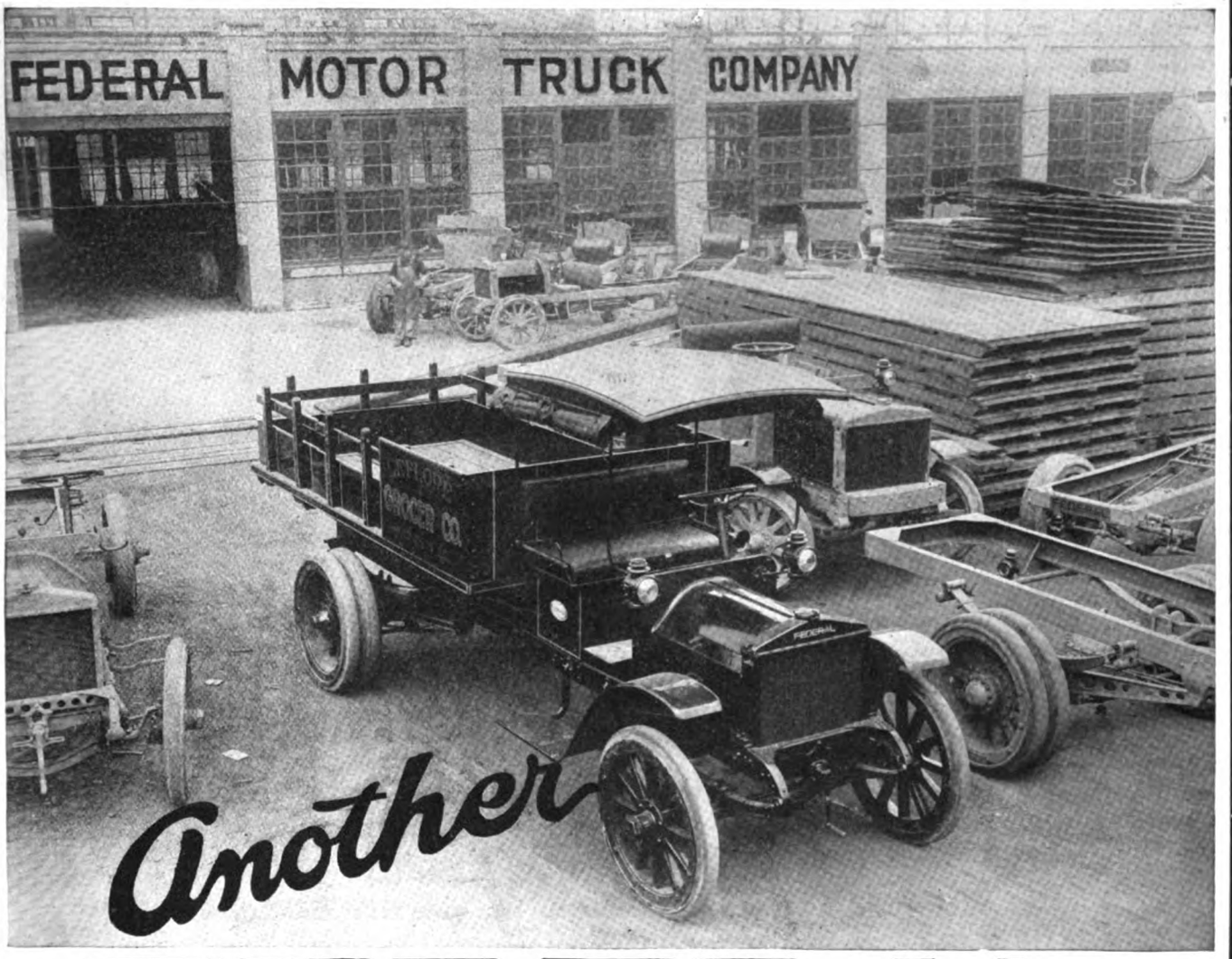


We are also manufacturers of Multiple Spindle Drills, Radial Drills, Lassiter Stay Bolt and Bolt Turning Machines.

Baush Machine Tool Company

Springfield Mass.

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FEDERAL

"Another Federal" comes out of the big Federal Factory every few minutes—for your customers—another haulage problem solved—another business speeded up.

"Another Federal" has been the frequent word from so many dealers in the past six years since the first Federal was made that the Federal output has increased 126 per cent yearly.

"Another Federal" is the continual order of so many firms that 60 per cent of all Federal sales are repeat orders.

One Federal sells "Another."

Federalize your territory—write us for the new "Blue Book of Traffic" which illustrates Federal Haulage in nearly every line of business.

Federal Motor Truck Company

Detroit, Michigan

1½, 2 and 3½ Ton Worm Drive Motor Trucks

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Kissel Kar Worm Drive Truck in service of J. Henry Amt Co.

The Correct Size for Every Job

Make the truck fit the job—not the job fit the truck. The new KisselKar Worm Drive Truck line supplies the most modern and economical service.

We are in a position to deliver the size that best does the work. Kissel's experience as one of the oldest truck manufacturers removes the question of experiment.

KISSELKAR TRUCKS

The Rapid Delivery Car at $950—chassis price—is a fast, sturdy, dependable little car built to carry ¾ of a ton.

The worm drive "Tonner" at $1250, "Two Tonner" at $1875 and "Four Tonner" at $2850 **are incomparable values.**

DEALERS—Send for literature and information about how we help you finance the sale.

Catalog on request.

KISSEL MOTOR CAR COMPANY, Hartford, Wis., U. S. A.

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U.S.

BALL BEARINGS

In Four Years

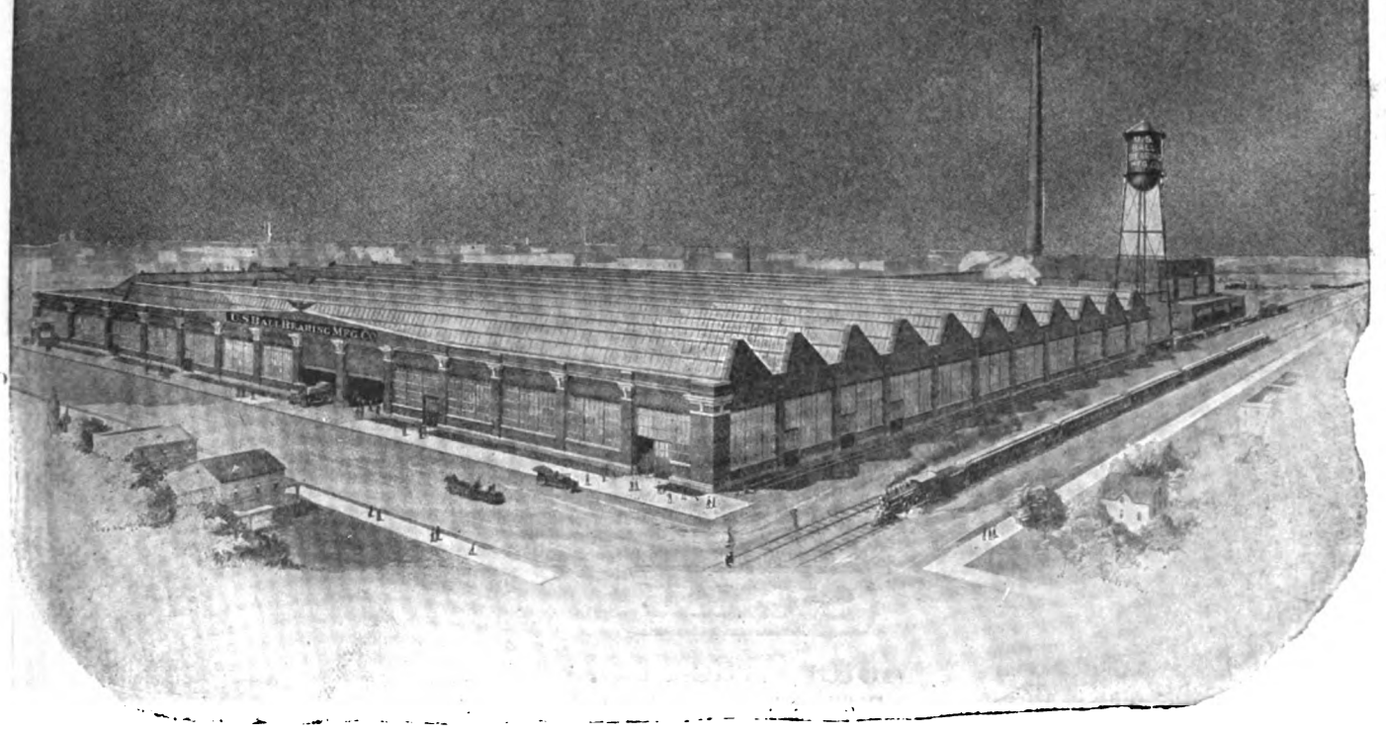
It has taken just about four years of actual manufacturing and selling to bring the U. S. Ball Bearing Manufacturing Company from an obscure concern to one of the largest manufacturers of high grade ball bearings in the country.

Back of this four years of rapid and comprehensive growth, however, lies four more years of experimentation and investigation before the first U. S. Ball Bearing was produced.

Illustrated, herewith, is our new factory, just occupied, which has a manufacturing capacity of more than 10,000 high quality ball bearings per day.

Attention is called to the fact that the product of the U. S. Ball Bearing Manufacturing Company is "quality" only, and no cheap bearings either in design or construction are produced.

U. S. Ball Bearing Manufacturing Co.
(Conrad Patent Licensee)
Palmer St. and Kilmar Avenue, Chicago



PLEASE MENTION THE COMMERCIAL VEHICLE WHEN WRITING TO ADVERTISERS

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On the Job!

Nothing stronger could be said about any truck. And it is this feature of being "*always on the job*" that is the very backbone of SIGNAL success.

It is recognition of the fact that a truck pays a profit only when it's hauling—not when it is standing idle—that led to the wonderful simplicity of SIGNAL design and the quality of SIGNAL constructon.

The SIGNAL Truck has the cleanest mechanism in the business. It's clean in two ways. *First*, it's clean because it's simple—not an unnecessary bolt or lug—no frills. *Second*, it's clean because every constructional unit—motor, transmission, axles, steering gear, frame, springs, wheels, tires, magneto—every unit is the best that can be built regardless of price or any other consideration—there's no room for suspicion that *any* feature *might* be better.

When you absorb that fact, you will have the secret and the backbone of SIGNAL success—and why SIGNAL sales are rolling up faster than ever.

1½ tons, to 5 tons capacity

Write at once for full details of the Signal line.

SIGNAL

Motor Truck Co.

DETROIT, MICHIGAN

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Overland

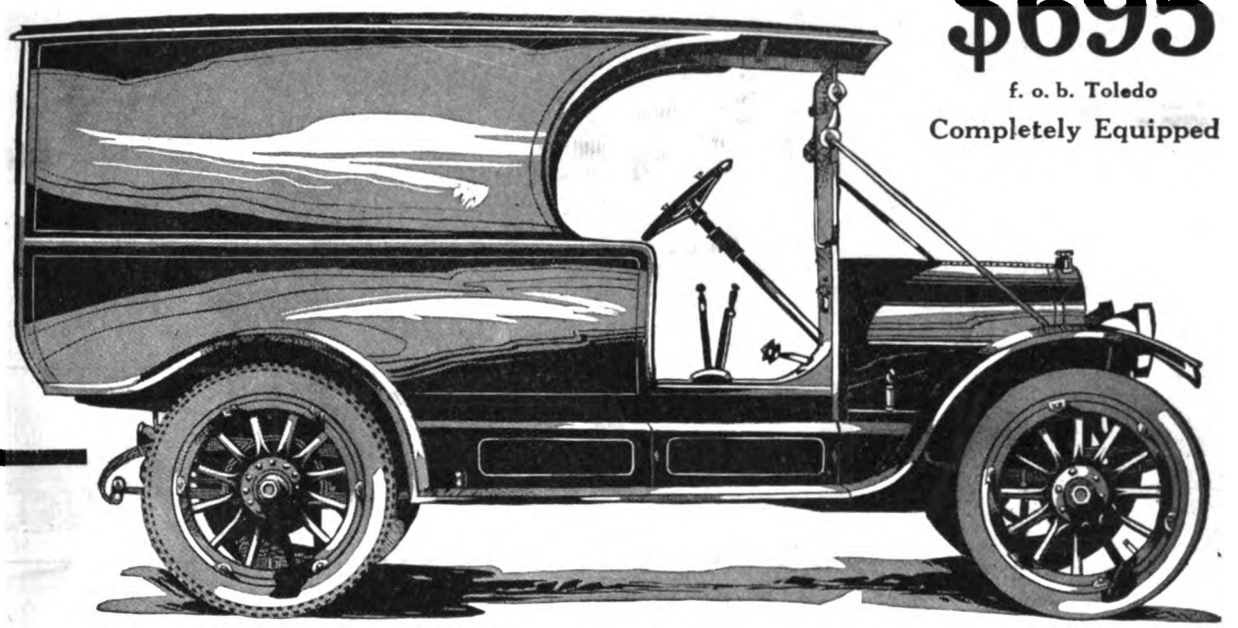
TRADE MARK REG.

MODEL 83-B

$695

f. o. b. Toledo

Completely Equipped



Does Your Delivery System "Slow Up" in Hot Weather?

Everyone knows how the horses suffer in hot weather—and how their efficiency consequently decreases.

Loads must be lightened or speed must be sacrificed. Extra trips must be abandoned—or extra teams with extra drivers must be put on to handle them.

But with an Overland Delivery Car you meet with no such difficulties.

The Overland carries its regular loads all day—and all night, too, if necessary—regardless of the weather. And it takes care of extra trips in addition to its regular work.

And it operates most economically.

The motor—of the latest en bloc design—gives ample power and speed for all requirements—yet uses a surprisingly small amount of fuel.

And the operating cost stops when the car stops.

Electric starting and lighting and all the conveniences of control are incorporated in the Overland Delivery Car.

Yet the cost *complete* is only $695.

Ask the Overland dealer for a practical demonstration. Ask him to prove to you how an Overland will meet the hot weather problem.

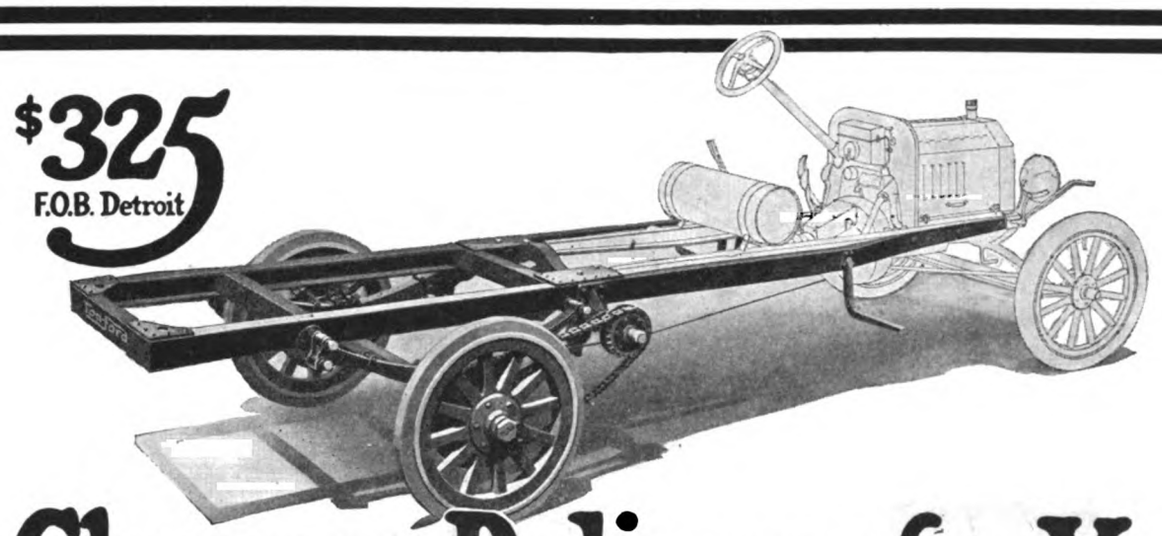
Catalog on request. Please address Dept. 191

The Willys-Overland Co., Toledo, Ohio

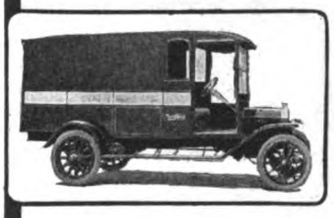
"Made in U. S. A."

778272

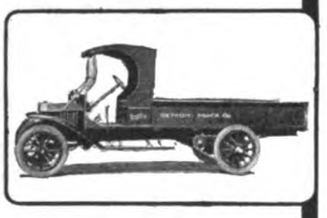
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Cheaper Delivery for You



Tonford
TRADE MARK



THE Tonford is making a wonderful stir in business circles all over the country. Wherever a delivery car or one-ton truck is being considered in any line of business the Tonford is being considered. Sales are growing by leaps and bounds.

The amazing economy and flexibility of the Tonford is simply turning upside down all the old ideas of what a one-ton truck can do and be. People *know* what a Tonford can do—they know now what it is doing. What you want is a one-ton truck that will carry the load without shirking—a truck that you can always count on working—365 days a year if you want it. A truck anyone can understand and operate. That's what you get in the Tonford.

SETS A NEW MARK IN TRUCK EFFICIENCY

This Tonford unit—made in Detroit—and a Ford chassis will give you a dependable one-ton truck that will do anything any one-ton truck can do—do it more cheaply, more efficiently.

There is practically no work to attaching the Tonford. There is no welding and no cutting—simply four holes to drill. And there is no alteration to the Ford chassis. You can change it back to a pleasure car if you want to at any time.

BUILT TO CARRY AN OVERLOAD

The Tonford stands up because it is built to stand up. There isn't a bit of guesswork or theory about it. It is built to resist the hard pounding of bad roads. The frame is heavier—the axles are stronger and larger, the bearings are larger, and every detail is better than you will find in any similar device. It is built to protect **YOU** against overload.

SIMPLE CONTROL—EASILY OPERATED

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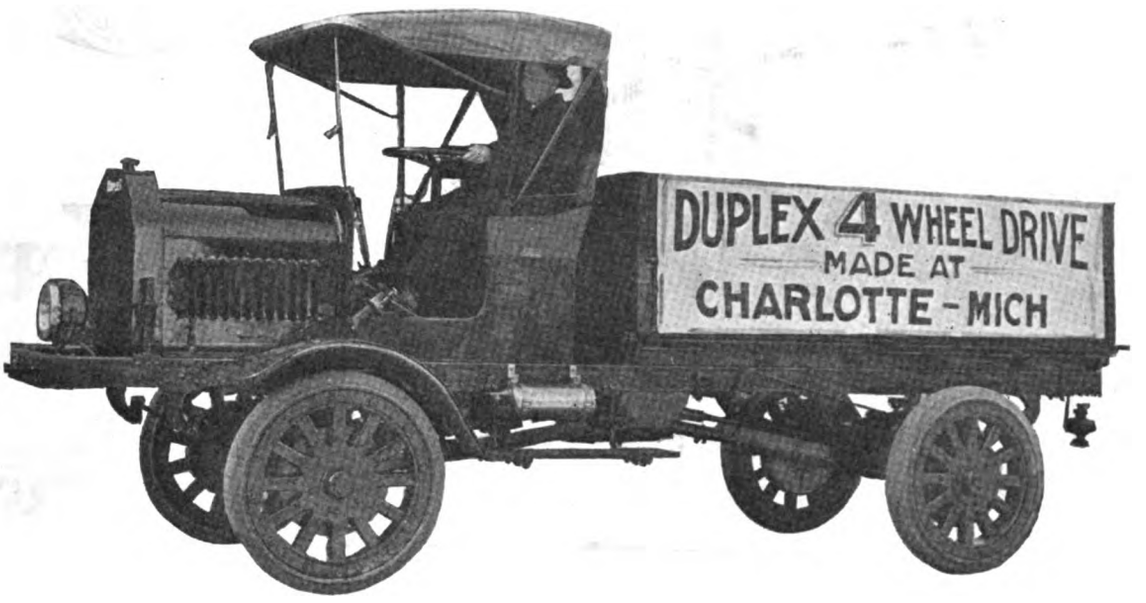
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Manufactured by

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¶ And, what is of still greater importance, is the fact that worm gear outlasts any other type of drive many times.

¶ This is just one of the characteristics of worm drive that has played an important part in bringing about the dominant use of worm gear axles for truck work.

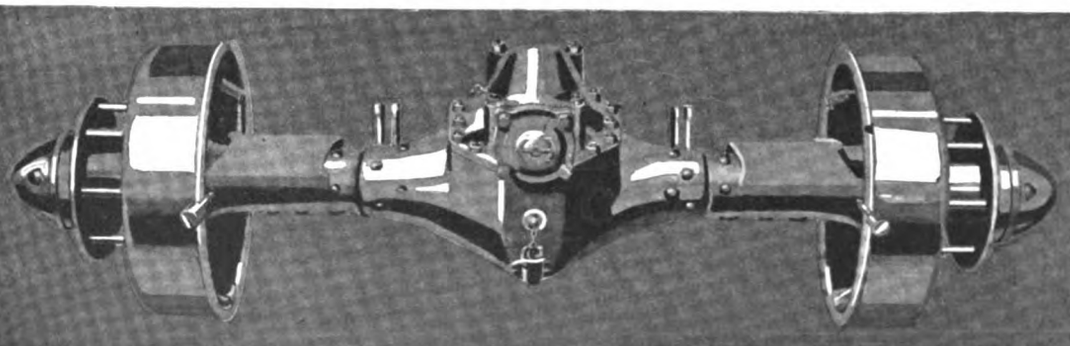
¶ At the present time 93 of the most successful truck manufacturers in the country are using worm gear axles, and about half of the models, and more than half of the trucks actually produced this year will be worm gear driven.

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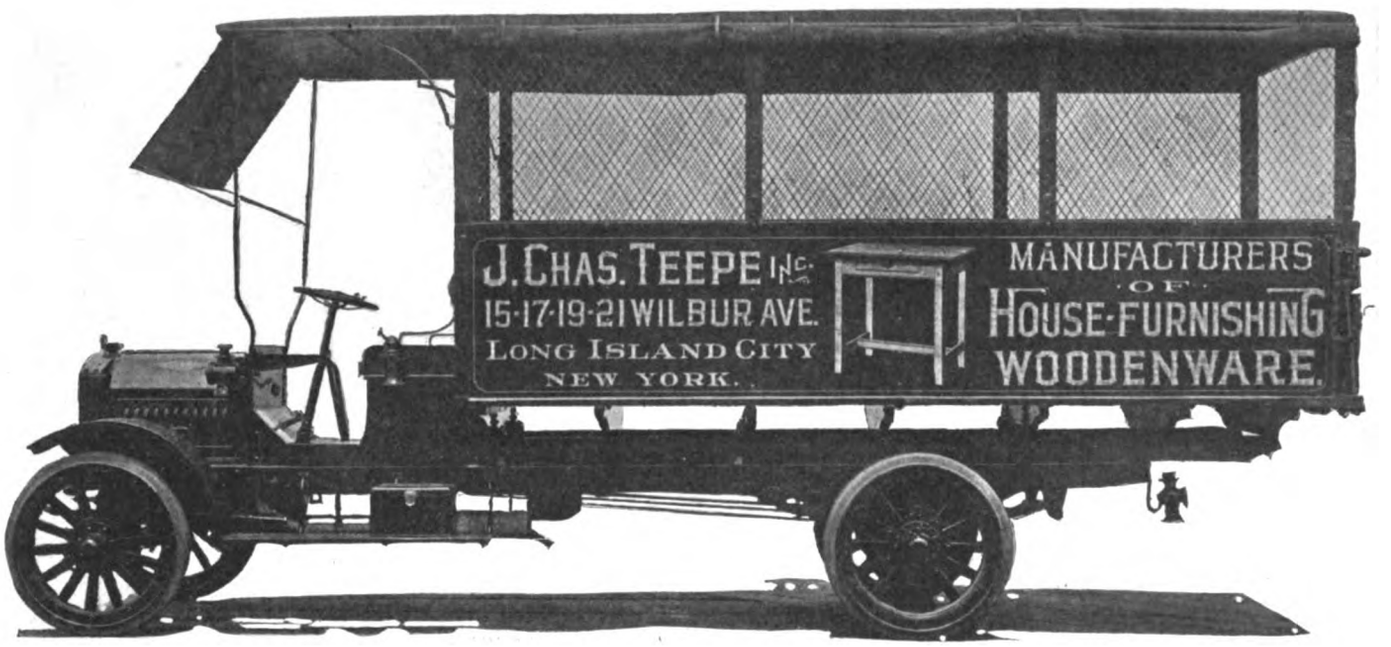
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Two-ton Capacity

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Constant Splash Lubrication—
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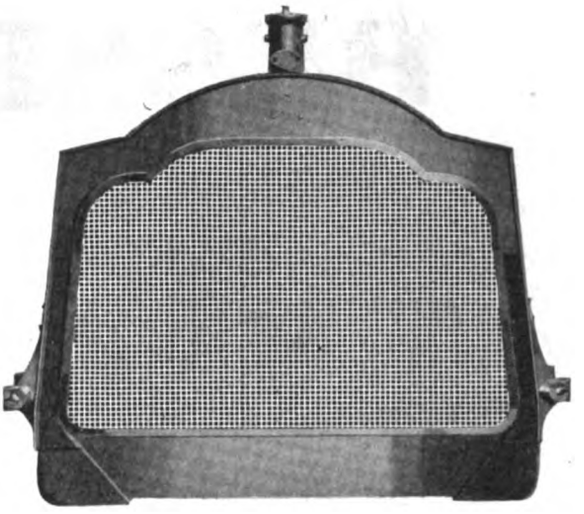
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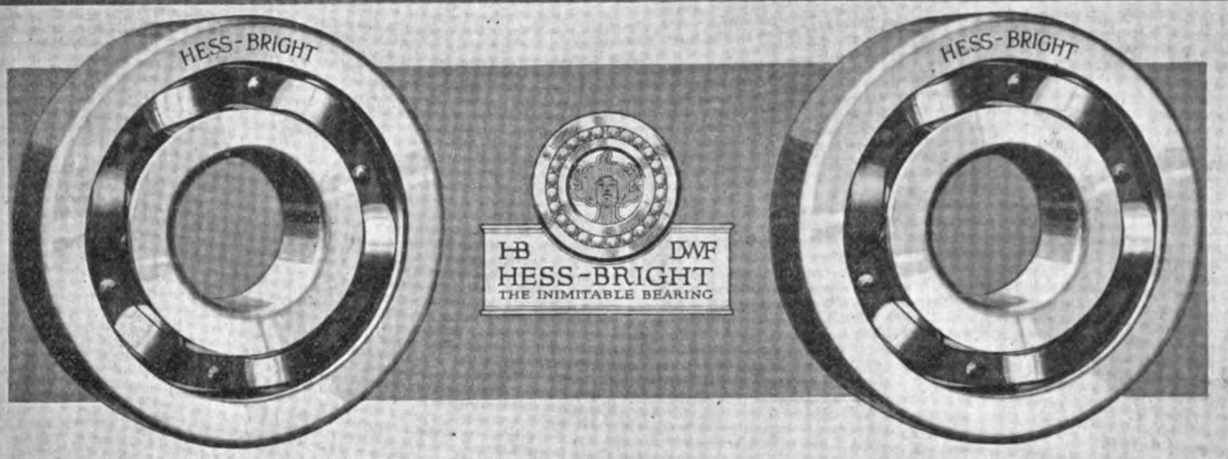
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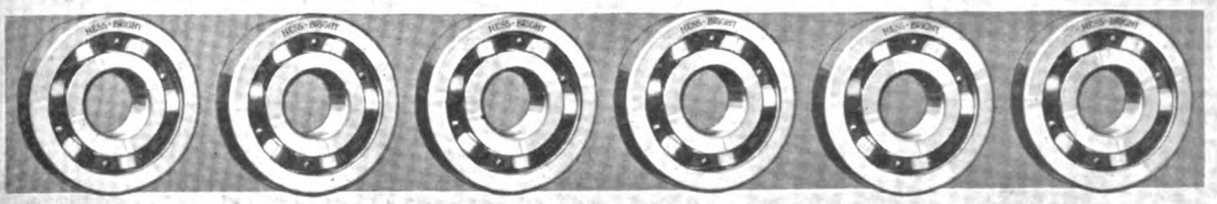


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No care or expense is spared in their manufacture.

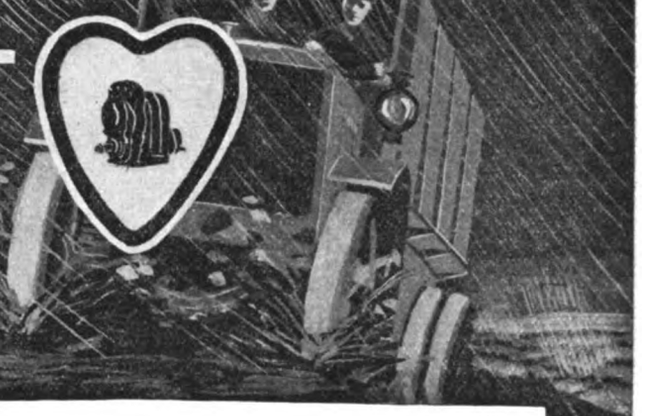
THE HESS-BRIGHT MANUFACTURING COMPANY
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The COMMERCIAL VEHICLE
Read by Business Men

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***In the Preparedness run from Fort Miley, San Francisco, to Halfmoon Bay,* recently made by the Thirteenth Company, Coast Artillery, U. S. A.**

NEW DEPARTURE BALL BEARINGS

American Made for American Trade

played their silent part ■ ■ ■

The Saurer truck which hauled the four and one-half ton howitzer on this trip, in record time, was equipped with New Departures.

While the demonstration thus made is of more than passing interest as a demonstration of motor truck efficiency, the great truth to be conveyed is, that this five-ton truck, its big and little brothers, which daily do their part of the world's work in peace and war, are rendered lastingly efficient by the installation of New Departure Ball Bearings.



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CHASSIS $1650



The Autocar carries a 2-ton load on a 97-inch wheel-base.

SHORT wheel-base with large body capacity — easy handling in close quarters — the Autocar is unique among motor trucks. It operates quickly in places too small for any other vehicle — team or truck — of like capacity.

Consider the narrow streets, the limited garage space, the congested traffic that confront your delivery equipment every day in the year — and then consider what the 1½- to 2-ton Autocar with its 97-inch wheel-base would mean to you.

Autocars Have Standardized Delivery Service

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Fecher & McGavock, Grocers, of Chicago, say:

"Two main points of advantage strike us about our Autocar. South Water Street, the produce market of Chicago, is jammed with vehicles from 5 a. m. to 4 p. m. Our car is so short it turns around or pulls out easily. It is the only vehicle we have seen that is conveniently handled in South Water Street.

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Write for Autocar Catalog and list of users



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ARDMORE, PA.

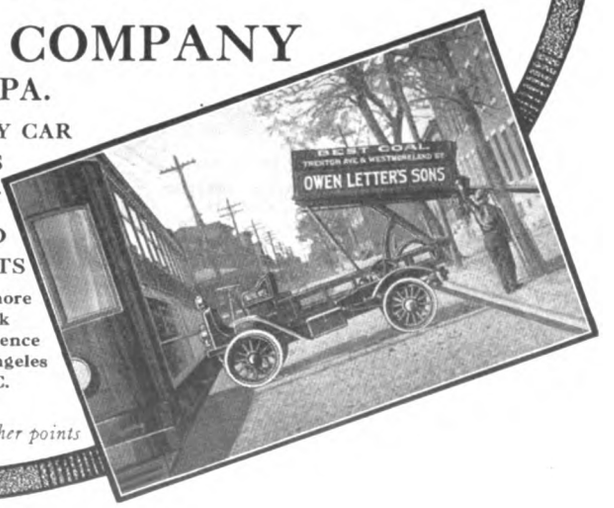
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The COMMERCIAL VEHICLE
Read by Business Men
Vol. XV August 15, 1916 No. 2

Truck Characteristics of Speed and Ability Make Munitions Maker Motorize

Eighteen-vehicle Fleet Saves Time and Money Hauling Shop Machines, Raw Products and Partly-finished Projectiles

SPEED, ability to operate 24 hours a day for months running and large carrying capacity compared with horse vehicles are three outstanding motor truck characteristics that made the E. W. Bliss Company motorize in time of need. This need was precipitated when a large foreign munitions contract lay within the company's grasp. Long famed for its manufacture of Whitehead torpedoes for the U. S. Navy and special machinery of all kinds, and located in Brooklyn, N. Y., close to the European shipping points, the Bliss company was in a good position to receive the order if adequate local transportation could be secured.

Although one of the company's plants was already engaged in the manufacture of munitions on a small scale, the plant was too small and the facilities for shell-making were too limited to fill the big order.

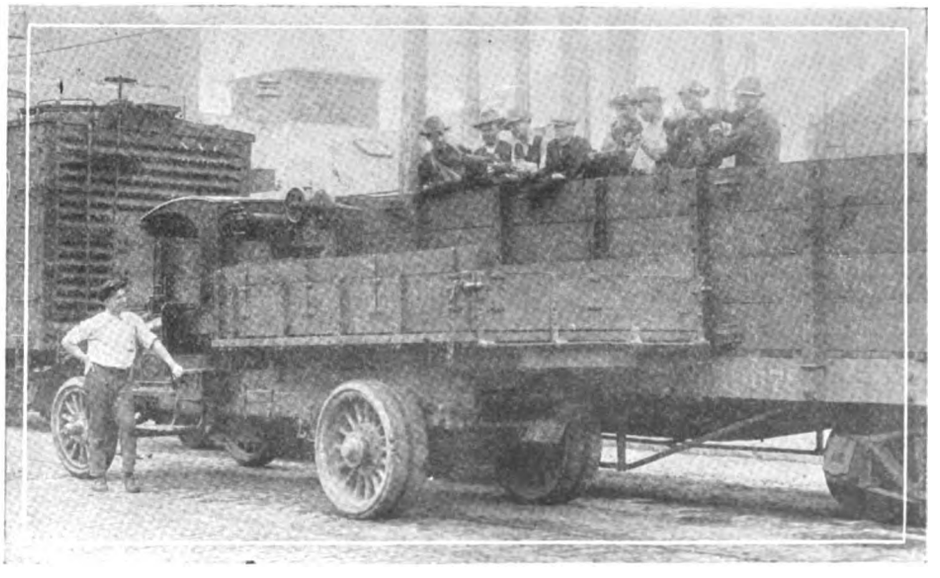
Quick Transportation Imperative

To secure the order it was necessary to act quickly. Inadequate facilities had to be brought up to adequacy rapidly. New buildings had to be erected and equipped with the required machinery. Rapid transportation was required for these two tasks and for quick transfer of partly-finished shells from one plant to another in their journey through the different stages of manufacture.

Up to the time the contract was accepted, horses had been used exclusively, twenty-six being used in all; but with the delivery time-limit clause of the contract in mind, small reliance was placed in the plodding beasts. They were too slow to permit the rapid construction work which the Aladdin of Armageddon demanded when he rubbed his lamp. The ambitious plans of the directors were impatient of their plodding sloth in getting the equipment in. They gave up the sponge in the race to keep pace with the lightning production of the different plants. They delayed operations all along the line because of their limited mileage capacity and the street congestion they caused at the loading and unloading points.

Accordingly, the Bliss company purchased its first truck, a 5-ton Pierce-Arrow. This proved highly successful in the haulage of lathes, drill presses, etc., etc., some of which were made in the Bliss factory and others obtained from eight or ten big machinery plants in New York City, Brooklyn, N. Y., and Jersey City, N. J. For picking up small material for the new plants, such as emery wheels, belt-line hangers, etc., etc., the 5-ton truck was considered too large because of the great mileage which had to be covered to pick up even a 2-ton load from the various plants where the goods were made. For this reason the next trucks purchased were 2-ton Autocars, a fleet of six of which were bought at once.

Then as the additional equipment was installed for the manufacture of shells and as the production of these increased, additional 5-ton Pierce-Arrows were purchased one or two at a time until twelve were in use. The present make-up of the Bliss fleet consists of twelve 5-ton Pierce-Arrows and six 2-ton Autocars, two of each make of which are equipped with power-dump bodies and the remainder



One of the 5-ton Pierce-Arrows with power-dump body being loaded with steel billets to be hauled to the various shops where the first shell machining is done

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with those of the rack or box types.

This fleet of trucks proved the salvation of the Bliss company's large foreign munitions contract, for it enabled the additional plants to be built and equipped in the minimum of time, and since then to carry the partly-finished shells from one plant to the others on a fixed schedule, day and night, over sun-baked pavements in the summer and over ice-glazed streets in winter. This carrying of the partly-finished munitions and of the raw products from the unloading points to the factory where the first operation is performed is of vital importance in the maintenance of the production schedule, for if one of the plants should be short of material to work on, it would of necessity cause the machines in that plant to be shut down and might also cause delays in the other shops. This, of course, would decrease the daily production besides interfering with the efficiency of the working organization, all of which means a wastage of time, and consequently of money, with the final possibility of additional losses under the time clause of the contract if the specified production were not maintained.

How Truck Work Is Divided

The work which the trucks do may be divided into four main classes, which include the haulage of the raw products from the points of unloading to the various manufacturing shops; the collection and delivery of small goods from plants in the surrounding territory to the Bliss shops; the transfer of the partly-finished munitions from one plant to another, and the final delivery to the points of shipment, and the delivery of special machinery made by the Bliss company to its customers within a radius of approximately 25 to 50 miles out of New York City.

To understand exactly how this work is carried out it must first be explained that the Bliss company has three large plants in Brooklyn, the main building, at Plymouth and Adams Streets, the second at Forty-first Street and the third at Fifty-third Street. Most of the special machinery manufactured is made at the main plant, while the munition work is carried out at the other two plants with the exception of few operations that are attended to by sub-contractors located in the manufacturing buildings at the Bush terminal.

What the Pierce-Arrows Do

The 5-ton Pierce-Arrows are used for the haulage of the raw materials from the points of unloading to the various shops; for the transfer of the partly-finished munitions from the Forty-first Street plant to that at Fifty-third Street, about ¾ mile distant, and from the latter back to the Forty-first Street building for additional manufacturing operations, and for the delivery of the special machinery from the main plant to the factories of the purchasers in the surrounding metropolitan territory. The Autocars are used for transferring the partly-finished shells from the Forty-first Street plant to the Bush terminal for the final operation; for the transfer of some of the smaller-sized partly-finished shells between the Forty-first and Fifty-third Street plants; for general pick-up work for all three factories, and for hauling the steel turnings from the lathe rooms to the points of shipment to the foundries where they are re-melted.

The work of the trucks in connection with the munitions manufacture begins after the arrival of the steel billets in freight cars at the Fifty-third Street plant. The Pierce-Arrows are used to distribute these billets to the various shops of the Fifty-third Street plant. After they have passed through one or more operations in these shops they must be transferred to the Forty-first Street plant, where they undergo still further operations, and are again taken back to the Fifty-third Street shops for additional work. They are again carried by the Pierce-Arrows back to the Forty-first Street works; from there to a plant in the Bush terminal by the Autocars, where the fuses are fitted, and from thence back to the Fifty-third Street plant, where they are loaded in freight cars or on lighters for the final shipment.

These several handlings of each shell carried by the trucks and the subsequent loading and unloading at each end would place the trucks under a large handicap in regard to operating efficiency and cost of haulage due to the time they must be idle while unloading, were it not for the fact that large gangs of men are employed to unload the raw products and elevating trucks and stands used to carry the partly-finished shells between the various shops.

Large Unloading Gangs Used

As shown in the illustration at the bottom of page 5, the steel billets from which the shells are made are unloaded directly from the freight cars in which they are received into the Pierce-Arrows by a gang of men standing inside of the cars. The billets are thrown into the truck body, the bottom of which is provided with a supplementary ash floor 2 in. thick. As many as twenty men are used to load one truck. This large number is used for two purposes: To keep the



Ten of the twelve 5-ton Pierce-Arrows which the Bliss company relied upon to enable it to successfully carry out a large order for the manufacture of shells for foreign consumption

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One of the six 2-ton Autocars owned by the Bliss company being loaded with partly-finished shells to be transferred from one of the Bliss plants to that of a sub-contractor where additional work is done. Note that elevating handtrucks and special stand boxes are used for rapid loading and unloading

truck in actual motion for the greatest part of the working day and to enable the freight car to be released so that demurrage charges are eliminated. To further increase the truck efficiency in this work, the two Pierce-Arrows equipped with dumping bodies are used so that the loads may be disposed of in the minimum time without the necessity of handling each billet.

Truck Saves $7,000 Demurrage

An average of twenty-five carloads of billets are received at the Fifty-third Street plant daily, so that it is evident that the cars must be unloaded very quickly in order to keep the demurrage charges from mounting into the thousands of dollars. In fact, the Bliss company calculated that one of the Pierce-Arrows with a power-dumping body had saved it $7,000 in three months in car demurrage fees which would have had to be paid were horse wagons used in the handling of the billets. During this period the truck worked continuously 24 hours a day by the employment of two drivers. Three or four blocks is the greatest distance which the trucks handling the billets must travel to distribute them to the proper shops, so that their mileage is correspondingly low. Yet they are much more efficient than horses. In fact it was decided that the number of horse wagons which would have been necessary to handle the same tonnage of billets as the trucks would have been so great that their use would have been prohibited because they would have blockaded the narrow plant roadways to the exclusion of vehicular traffic of all kinds.

Pierce Hauls 115 Tons in Day

With the large unloading force of twenty men, the Pierce-Arrow 5-tonner has made as high as twenty-two or twenty-three round trips per 24-hour day, thus moving from 110 to 115 tons. The number of horse wagons necessary to accomplish the same amount of work would have been large, due to the rest periods required for the animals. The cost of doing the work would have been greater than by trucks, even though the congestion due to narrow roads had been eliminated.

The usual loading and unloading delays of the trucks employed in handling the partly-finished shells have been decreased by the use of elevating handtrucks and boxes with two narrow stringers on the bottom so that the handtrucks in their lowered positions may be run under the boxes and then elevated. Short platform skids are provided at each of the points of loading and unloading. These are attached to the rear ends of the truck bodies and the handtrucks pushed up them and under each box in turn. The handtruck is then elevated and the handtruck and box loaded with shells rolled off in a few minutes' time, whereas by hand it would take several times as long. The smaller-sized shells are stacked in the boxes as shown in the illustration at the top of this page. The larger shells are carried in somewhat larger boxes of the same type except that they are provided with interior slats and cross slats similar to the cardboard separators in an ordinary egg carton. Seventy-two shells are carried in each box, each shell being in its own pigeonhole so that it cannot come into contact with the ones surrounding it. Four boxes make up a full 5-ton truck load.

Five-Ton Truck Delays Costly

While it was found very economical to use the 5-ton trucks in the haulage of partly-finished shells between the Bliss plants because of the elimination of the loading and unloading delays accomplished by the use of handtrucks and the special boxes, delays beyond the Bliss control at the shops of the sub-contractor at the Bush terminal rendered them unsuitable for that particular haul. Accordingly, the 2-ton trucks were used for the hauls to and from the Bush terminal for the reason that the delays encountered by a 2-tonner are less expensive than delays of the same duration with a 5-ton truck.

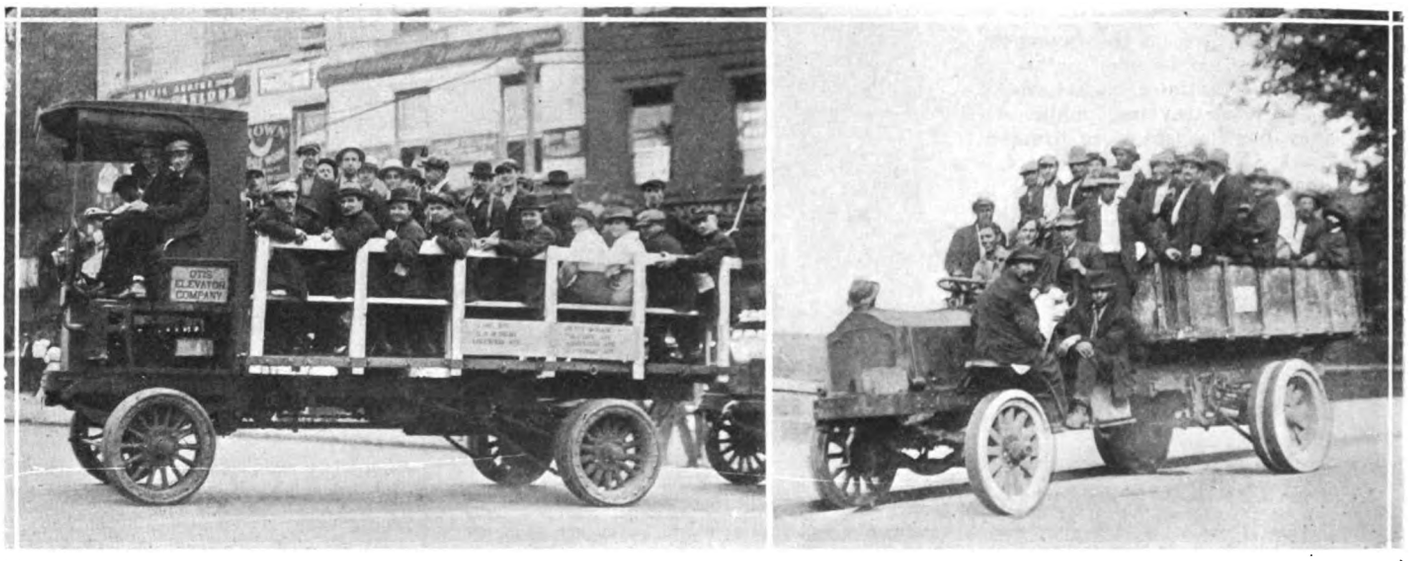
While the elevating trucks were used at the Bush terminal as well as at

(*Continued on page* 21)



One of the Pierce-Arrow 5-tonners engaged in the work of delivering special machinery made by the Bliss company to its customers in the Metropolitan territory. The garage superintendent is cautioning the truck driver against overloading by judging the weight carried by the shape of the rear springs

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How Yonkers manufacturers kept going despite the cessation of street car service. The Otis Elevator Co. operated five of its heavy Mack trucks fitted with improvised passenger accommodations, as at the left, and the Yonkers Asphalt Co. followed suit in a more picturesque if less comfortable manner

Motor Buses and Trucks Save Shoe Leather in Gotham Traction Strike

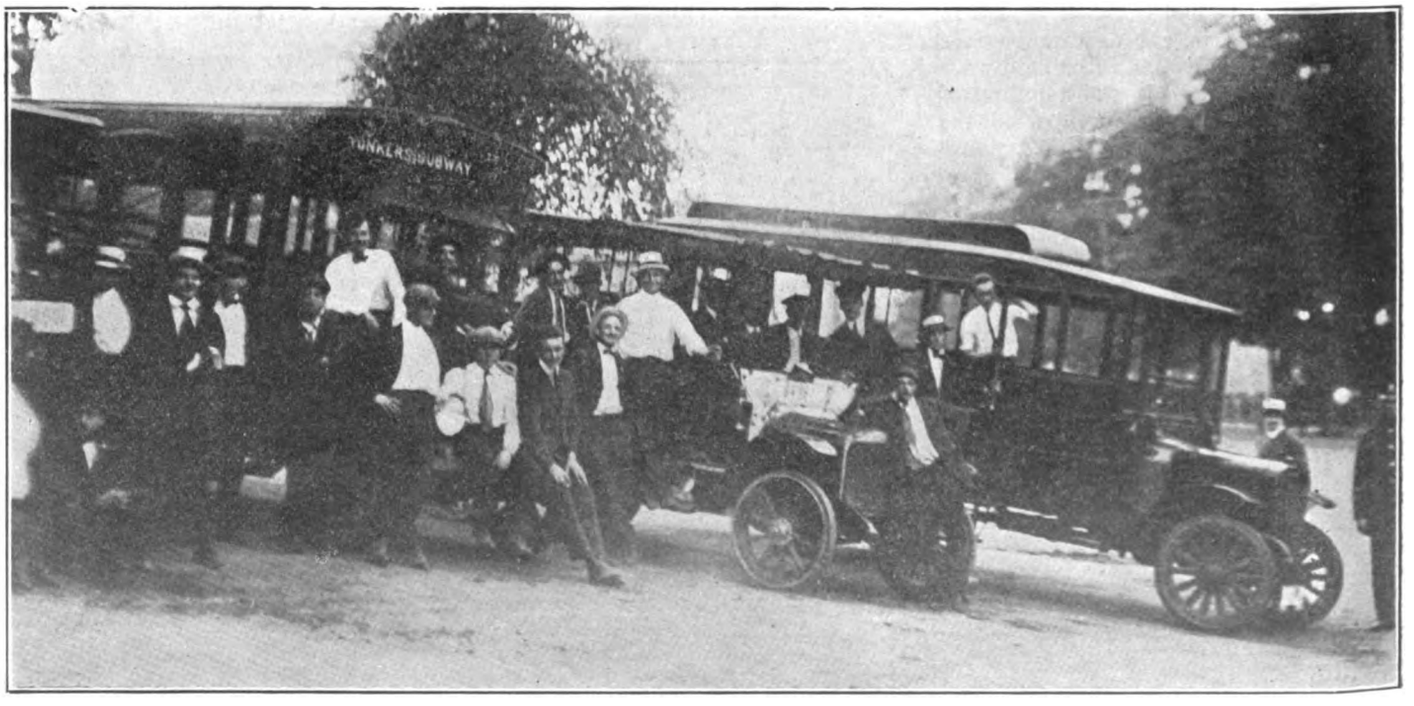
SURFACE car transit has been practically at a standstill throughout the whole of southern New York State for more than a week owing to a strike of motormen and conductors. While the traction firms and the unions were deadlocked beyond the ability of the mayors of five cities to effect any agreement, New Yorkers and suburbanites have been employing almost every known means of transportation to take the places of the street cars.

The trouble started in Yonkers and spread rapidly throughout other Westchester County cities, such as Mount Vernon, New Rochelle, the Pelhams, Bronxville and Tuckahoe, spreading like the infantile paralysis epidemic from thence on, first engulfing the Bronx borough of New York City in transportation paralysis, then Manhattan Island itself, Queensborough, parts of Brooklyn and Staten Island.

The subways and elevated lines, inadequate enough even in normal times, offered but little relief to the 2,500,000 persons affected.

Jitney buses and buses of higher fares, motor trucks, touring cars and erratic attempts to restore car service with strike-breakers have since been the characteristic surface transit of the lower section of the Empire State.

In Yonkers and other Westchester cities where a law forbidding the opera-

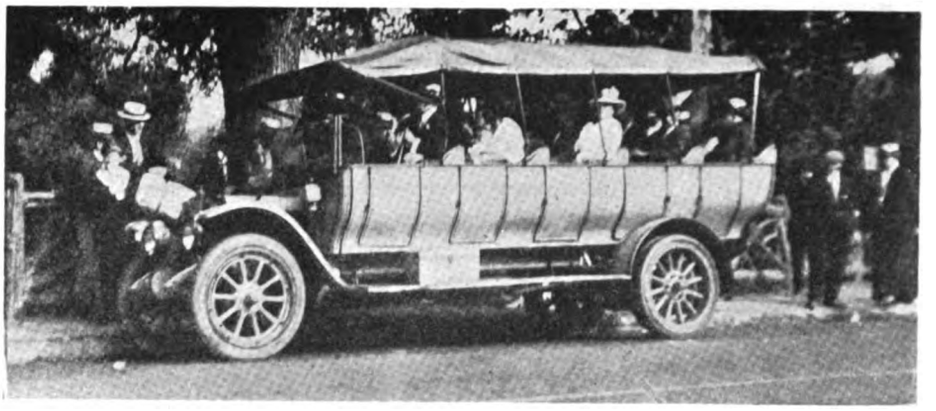


A strike within a strike—Large passenger buses, operated on regular schedules, which went on strike because of the influx of irresponsible jitney competition whose mushroom growth was occasioned by the street railway strike

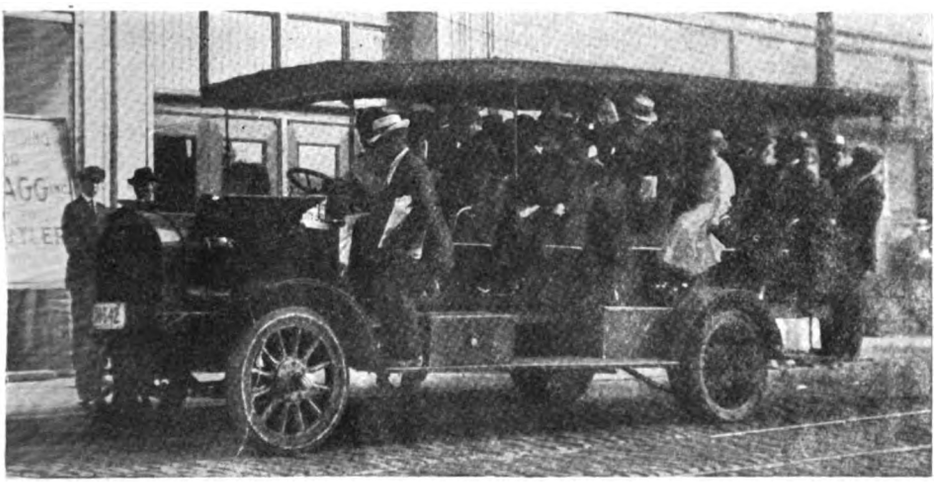
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tion of street cars by men with less than 15 days' experience on the routes made strike-breaking impossible, motor buses have been substantially the sole dependence of the local traveling public. Over 300 jitney bus licenses were granted in New York City alone on Aug. 4, six times more than at similar times normally. These licenses were granted without reference to the legal restriction of bus operation to routes non-competitive with existing traction lines.

In Harlem, flat dwellers paid 10 cents for rides in all sorts of motor vehicles on crosstown routes connecting with the subways, elevated lines and the New York Central line. Owners of these cars are said to have cleared from $25 to $50 per car.



A White 1½-tonner replacing the trolleys between Getty Square and Mount Vernon

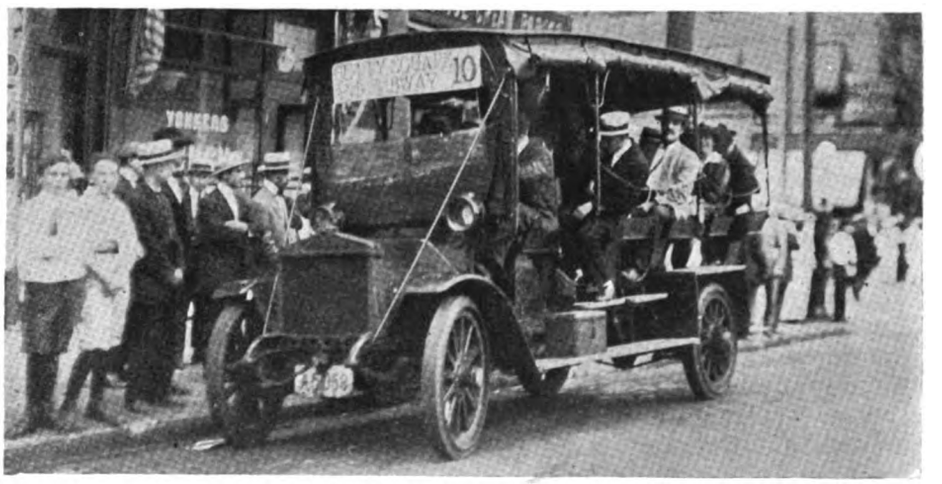


A big Mack sight-seeing bus which forsook its peaceful pursuit of showing out-of-towners the wonders of Gotham to transport Yonkers from the Broadway subway's end to Getty Square at 10 cents per ride, catch as catch can

In New Rochelle, where a tentative motor bus service was recently abandoned after a few weeks' trial, buses of all sorts and kinds did a land-office business at fares up to 25 cents.

Yonkers, a city of 90,000, is overrun with buses. A strike within a strike was staged there when a fleet of large licensed buses were withdrawn from much-needed service because of the wildcat competition of irresponsible jitneys. Wholesale arrests were made when New York busmen invaded Yonkers without permits. Sight-seeing buses abandoned their usual stands, sober trucks of commerce donned outlandish passenger bodies, rude benches were built in other trucks, all in the pursuit of fares spurned by the erstwhile traction lords.

From the end of the Broadway subway at Van Cortland Park to Getty Square, Yonkers, some 3½ miles, more than a dozen buses operated, and from Getty Square to Mount Vernon between eight and ten buses maintained service, the distance being 5 miles each way. On the subway buses a 10-cent fare was charged, on which one man with a large Mack bus collected $127 from 6 a. m. to 7 p. m. On the Mount Vernon route a 25-cent fare is charged, or less for way stops.



A Federal which stopped delivering merchandise to try its hand—or wheels, rather—at passenger delivery, with a hastily-adapted body



The Grand Old Truck of Yonkers, a Chase air-cooled three-cylinder two-cycle truck applied to Yonkers work in 1910 by the enterprising Mr. Lemkul. The progressive owner has never let the truck rest, nor has he failed, in the 6 years he has run it, to find profitable labors for it. He was among the first to answer the siren call of the jitney, venturing upon a feeder route from Getty Square to the Lakewood avenue residence district. A competing Ford looms in the background

When the cars in Queens County all but abandoned the streets many pleasure-seekers found themselves stranded on the beaches, far from transportation. Keepers of the resorts at North Beach found the crowds dwindling to one-third less than the unusually small crowds that

(*Continued on page* 20)

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Have a Trucking Policy

SUCCESSFUL business must of necessity be based upon sound policy. Efficient operation of motor trucks can no less dispense with intelligent planning in advance. A manufacturer must carefully scrutinize the field before he throws his wares upon the market to be assured that the product he merchandises shall be one that buyers are demanding and that the particular design or quality of article he produces is one that is not inferior to others which are offered at similar prices.

Similarly the truck operator must carefully survey his transportation problem before he turns a wheel. Commercial road transportation consists of moving goods of a certain degree of fluidity, divisibility, density, fragility and perishability between points certain distances from each other, of certain accessibility, over roads of certain sorts, with certain grades to be encountered, with a certain degree of traffic congestion to be met with, in given time limits, and with certain controlling extraneous factors such as loading and unloading facilities, seasonal work, peak loads, etc., to be considered.

These factors are common to all hauling or delivery problems and so the simplest of them is quite complicated when carefully analyzed.

The faculty of auto-analysis is one of the most valuable a business man may possess. Barring accidental happy thoughts, most simple solutions of knotty problems are the result of reducing the whole of the problem to its parts and then reassembling them into a more perfect whole.

Every user of trucks has a traffic problem. He has a set of simple operations to perform, which through their multiplicity go to form a complex whole. The adoption of motor trucks implies a desire to form a more perfect traffic scheme. To merely change the motive power of one's rolling stock will not alter the problem in any important degree. Only a thorough analysis of the problem followed by a synthetic re-construction along a logical plan can improve conditions. In most cases such a study of haulage efficiency cannot but result in the motorization of haulage or delivery to some extent.

Having determined on the plan, having perceived the principles which underly success in the undertaking, to conserve this ideal traffic scheme it is necessary to formulate an operating policy.

An operating policy is much the same as a train schedule of a railroad, its application much like the train dispatching work of its staff.

Analysis of the character and weight of the loads, the units which must be delivered separately or to different points and a consideration of the distances to be traveled determine the sizes of trucks to be applied to the service, the number of trips to be made by each vehicle and to each point. The times of these trips depends upon traffic, loading and unloading conditions. Each of these factors also determine what type of equipment shall be used.

"As ye sow, so shall ye reap" is true nowhere to a greater extent than in the operation of commercial vehicles.

The Public and the Motor Bus

THE motor bus is not dead but sleepeth. Today motor buses should be used in ten times the number they are. It is unfortunate that the small-car jitney lead the recent motor bus boom. No public utility can exist without public demand. The public does not demand what it has never seen or what has been improperly introduced. In more than a score of cities the motor bus might have succeeded but for popular prejudice excited by the irresponsible operation of unsafe conveyances upon poor schedules or no schedules. In others, propaganda backed by antagonistic traction interests has prevented the public having a fair trial.

In other cities the motor bus has met with popular approval and has survived. In New York City the public has fought opposition, delay and misrepresentation in quest of more motor buses. It is eminently satisfied with what buses it has. One effect of large traction combinations has recently been suffered in one of the greatest street car tie-ups in history.

In a small city near New York a motor bus system was started last spring and before the people had had an opportunity to get used to it, it was withdrawn for lack of capital. A few months later the strike stopped all of the cars. Motor buses again appeared on the streets. The next bus venture in that city will succeed.

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Studebaker Business Increases 50%

Motor Vehicle Business Is 80% Ahead of Last Year

SOUTH BEND, IND., Aug. 7—That the Studebaker Corp. has done a business 50 per cent greater than at any previous time in its history, that the motor division is running 80 per cent ahead of last year and that for 12 months it has confined itself exclusively to other-than-war business are some of the points which came to light at a recent directors' meeting. It is stated that net profits for the first 6 months of 1916 were $6,028,329.06, as compared with $5,774,074.87 for the same period last year, which is an increase of $254,254.27. The corporation is wholly free from indebtedness and has over $4,000,000 in banks.

At this meeting the Directors departed from the former practice of paying quarterly dividends on the common at 1½ per cent plus 1 per cent extra by declaring a 2½ per cent dividend on the common and a 1¾ per cent on the preferred, payable Sept. 1 to stockholders of record at the close of business Aug. 21.

NASH TO SWELL JEFFERY PRODUCTION

KENOSHA, WIS., Aug. 9—Plans have been launched to multiply as rapidly as possible both the truck and the car output of the Thomas B. Jeffery Co., Kenosha, Wis., which recently changed ownership. C. W. Nash, foremost among the purchasers and the company's new chief executive, is now located at the big works personally directing the steps toward its expansion.

"The policy of this company will be to increase the production as fast as is consistent with quality," Mr. Nash says. "We shall also improve, if that is possible, the quality of Jeffery cars and trucks."

HOUGHTON BUYS OHIO TRACTOR

MARION, OHIO, Aug. 6—W. H. Houghton, president of the Houghton Sulky Co., has purchased at receiver's sale the personal property of the Ohio Tractor Mfg. Co., which includes the material on hand, finished product, patterns and patents, which have been in the hands of Charles H. Lewis as receiver.

Mr. Houghton announces that he may go on manufacturing tractors, using the patterns of the Ohio company. It is generally understood that Mr. Houghton and his associates will purchase the building from the receiver as soon as the court forms can be complied with. The company will be reorganized by the election of Ellis H. Houghton as general manager of the tractor concern.

FALLS TO DOUBLE OUTPUT

SHEBOYGAN FALLS, WIS., Aug. 5—New money, new control and further facilities are expected to increase the output of Falls motors from fifty per day as at present, to eighty per day before Oct. 1, and by the first of the year to 100 per day. A new test department 250 feet long, having a capacity of 120 motors daily, has just been completed, and within a few days contracts will be let for the erection of an addition to the assembly department, 180 feet long by 120 feet wide. Four hundred and fifty men are at present employed and the force is being increased.

Although the company has specialized the manufacture of overhead valve motors for the past two years L-head types are still being produced. The Falls Motors Corp., which succeeds the Falls Machine Co., is officered by the same staff as before: G. Huette is president; R. W. Randall, vice-president; A. R. Clas, secretary, and K. F. Schreier, treasurer. In addition to these Leroy Miser is vice-president and J. G. Lude, formerly purchasing agent, assistant secretary.

GILLETTE TO MAKE PARTS

SOUTH BEND, IND., Aug. 7—A line of motors, manifolds and accessories to be marketed under the name Wilmo will be produced by the new Gillette Motors Co. which has just purchased the old Amplex plant at Mishawaka, Ind. This concern is at present working on the Wilmo manifold. The concern is headed by King C. Gillette, president, who is the father of the safety razor industry. Arthur M. Howard is vice-president, Russell Simmons is treasurer and Frank L. Belknap is secretary.

The Wilmo manifold is a combination exhaust and inlet header whose purpose is to pre-heat the incoming gas to more completely vaporize it, thus permitting of the successful use, it is said, of lower-grade fuels. Another product which is to be manufactured is the Wilmo rotating sleeve motor. The company is capitalized at $3,000,000.

GOODRICH PROFITS FOR 6 MONTHS $4,800,000

AKRON, OHIO, Aug. 2—The books of the B. F. Goodrich Co., this city, were closed on July 1 for the purpose of determining the result of operations for the first 6 months of 1916. After making proper provision for maintenance charges, depreciation, doubtful accounts and all known outstanding current liabilities, the net profits for the period amounted to $4,800,000, an increase of 20 per cent from the same period a year ago, net then being $4,000,000. The increase alone is equal to the 6 months' dividend on the $27,000,000 preferred.

SCHWARZ HAS BEST YEAR

PHILADELPHIA, PA., Aug. 10—Closing its fiscal year with the greatest volume of business done in any year and a large volume of business on the books for the ensuing year, the Schwarz Wheel Co., at Frankford re-elected the officers who have engineered the company in the past. At the same stockholders' meeting held Tuesday at which this action was taken it was announced that a tract of 6 acres at Holmesburg, a short distance from the present plant, has been purchased for extensions.

As president and general manager, S. Vance Lovenstein was re-elected; as vice-president, Louis J. Kolb; treasurer, Jerome H. Louchheim; and secretary, Charles Q. MacDonough.

Ford to Bring Out a 1-Ton Truck

Ready Next Fall — Expected Output 200,000—Low Price

DETROIT, MICH., Aug. 5—Some time during next fall the Ford 1-ton worm-drive truck is expected to be ready for delivery. Demonstrators are expected to be in the hands of Ford distributors or agents within the next few months.

What the price will be at which the Ford Motor Co. will sell this truck, officials claim not to know themselves, as it has not yet been decided, they say. It was stated from other sources that the price will be around $500, possibly a bit lower than this, and that it is expected that 200,000 of these trucks will be made during the first year.

STUDEBAKER GETS FLUSHERS PATENT

SOUTH BEND, IND., Aug. 2—The Ottofy patent on street flushers has been acquired by the Studebaker interests. This patent was purchased from the Sanitary Street Flushing Co., which for more than 5 years has been conducting infringements suits in the federal courts. The courts have sustained the claims of the Sanitary company, and it said that the Ottofy patent is basic. The principal claim in the Ottofy patent No. 759,059 is

"Any flushing machine made or that can be changed or adjusted to deliver a flat stream of water under pressure forward and laterally at an angle of 20 degrees or less."

The Studebaker Municipal Utilities Co. has been organized to control this patent, and it is the intention of the vehicle division of the Studebaker organization to manufacture flushers under this patent.

1500-POUND MORELAND

LOS ANGELES, CAL., Aug 2—The Moreland Motor Truck Co. of this city has announced a new 1500-pound capacity light delivery model which is to sell for $990. The new Moreland truck is equipped with 3¼ by 5 Wisconsin motor, Timken axles and roller bearings throughout, three speed gearset and choice of solid or pneumatic tires.

TORBENSEN ADDS 4 ACRES

CLEVELAND, OHIO, Aug. 7—Four acres of land have just been purchased here by the Torbensen Gear & Axle Co. of this city. This is in addition to the buildings which are now under construction and which will, by Aug. 15, place 50,000 sq. ft. of manufacturing space at the disposal of this concern. The principal product of the company is the Torbensen internal-gear rear axle for commercial vehicles. The new factories will be of the monitor type, constructed of brick and steel with metal sashes.

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Awards of Post Office Trucks Made

Blanket Order for 1916-17 Vehicles of ½ to 3 Tons

WASHINGTON, D. C., Aug. 10—Awards for supplying the Post Office Department with ½-, ¾-, 1-, 1½ and 3-ton trucks have been awarded in response to bids submitted to be opened Aug. 15. No quantities are specified as this order is a blanket one to cover all of the requirements of the postal service during the fiscal year ending June 30, 1917.

In the ½-ton class the Henderson-Rowe Auto Co. of Washington, D. C., offering Kisselkars, was awarded a contract at $1,085 for the chassis, $885 for each body built according to the Post Office Department's specifications and $200 each for stock commercial bodies of similar type, a stipulation being that the wheels must be equipped with Firestone demountable rims.

The ¾-ton awards were shared by the Reo Motor Car Co., Lansing, Mich., and the White Co., Cleveland, Ohio. The Reo prices were $1,350, complete with body; $1,000 each chassis only; $350, Post Office Department's specification body; and $1,075, chassis complete with commercial body.

The White prices were $1,970 for chassis with body; $1,680 for chassis only; $300 Post Office Department's specification body; $1,832.50 chassis and stock screen body; and $2,032.50 chassis with stock panel body.

In the 1-ton class the Henderson-Rowe company bid $1,315 for a Kisselkar chassis complete with body; $1,115 for the chassis only and $200 with the Post Office Department's specification body.

The 1-ton order was also awarded to the White Co. at $1,970 complete with body; $1,680 for chassis only; $300 for the Post Office Department's specification body; $2,000 for the chassis with a stock panel body; and $1,800 with a chassis with a stock screen body.

Three awards were made in the 1½-ton class, the Autocar Co., Ardmore, Pa., receiving the contract at $1,850 for the chassis complete with body; $1,600 for the chassis only; and $250 for the Post Office Department's specification body.

The Packard Motor Car Co., Detroit, successfully bid at $2,635.80 for chassis complete with body on solid tires; on cushion tires $2,725.20; $2,328.80 for the chassis only on solid tires, $2,400.20 on cushion tires; and $290 for the Post Office Department's specification body only.

The White award was for $2,720 for the chassis complete with body; $2,435 for the chassis only; $310 for the Post Office Department's specification body only; and $2,560 for the chassis complete with a stock body of the screen type.

Two awards were made in the 3-ton class, these being to the White Co. and to the Locomobile Co., Bridgeport, Conn. The White company bid $3,315 for the chassis complete with body; $2,960 for the chassis only; $365 for the Post Office Department's specification body only; and $3,150 for the chassis with a stock platform body.

The Locomobile bid for Riker trucks, complete with bodies, was $3,500 each; for the chassis only $3,150; and for the Post Office Department's specification body only $350.

An interesting proviso in connection with these awards is as follows:

"The Post Office Department reserves the right to purchase or test a very limited number of the following trucks:

"Three-quarter-ton Brockway truck from the Brockway Motor Truck Co., Cortland, N. Y.

"One-ton Garford truck from the Garford Motor Truck Co., Lima, Ohio.

"One- and one-half-ton Signal truck from the Signal Motor Truck Co., Detroit, Mich.

"Three-ton U. S. truck from the United States Motor Truck Co., Covington, Ky."

PACKARD SENDS CARDWAY TO S. A.

DETROIT, MICH., Aug. 2—The Packard Motor Car Co. is sending Fred Cardway to South America to establish dealers in various parts of the country. Both truck and car agencies will be established, it being Mr. Cardway's intention to leave for Rio de Janeiro early in September, from where he will make an extended trip throughout the most important sections of the southern continent.

OTTAWA TRUCKS INCREASE

OTTAWA, ONT., Aug. 5—The number of delivery motor trucks in the capital city has nearly doubled during the past year. An explanation of this is given in the fact that merchants who have been keeping four and five horses to handle the delivery of their goods are finding that one truck will do the same work with less cost. This notwithstanding that on January last the license fees were considerably increased.

HEAVIER WARNER TRAILERS

BELOIT, WIS., Aug. 4—A. P. Warner, formerly of the Warner Auto Meter, will shortly put on the market heavy duty trailers of 2-, 3- and 5-ton capacity. The Warner trailer coupling will also be manufactured and is expected to be used as standard equipment on several well-known trucks. The Warner Prairie Schooner and trailers are made by the Warner Mfg. Co.

Coming Commercial Vehicle Events

Aug. 15	New York City, Meeting of the Metropolitan Section, S.A.E., Hotel Majestic. Subject, South America.
Aug. 14-18	Cedar Rapids, Iowa, National Tractor Demonstration.
Aug. 21-25	Bloomington, Ill., National Tractor Demonstration.
Aug. 28-Sept. 1	Indianapolis, Ind., National Tractor Demonstration.
Sept. 4-8	Madison, Wis., National Tractor Demonstration.
Sept. 13	New York City Annual Outing, Motor Truck Club of America, Inc.
Sept. 10-16	Milwaukee, Wis., Second Annual Motor Show, Machinery Building.
Oct. 20	Cincinnati, Ohio, Good Roads Show, Music Hall.
1917 Jan. 13-20	Montreal, Que., Can., Montreal Motor Show.
Feb.	Newark, N. J., Passenger Car and Motor Truck Show, First Regiment Armory.

Buffalo Plans Use of Garbage Trucks

Would Work Motors with Horses for Economy

BUFFALO, N. Y., Aug. 5—Street Commissioner William F. Schwartz has under consideration a plan for the use of motor trucks in the collecting of garbage and refuse and the cleaning of streets, and which he says will save the city 40 per cent of the present cost of doing this work or close to $100,000 a year.

Under the present system wagons, drawn by either horses or mules, leave the barns early in the morning and go to districts assigned them, where they collect garbage, refuse and dirt from the streets until they are filled. Then they are driven several miles to the dumping grounds, where it takes a little time to unload them by dropping out the bottoms. It takes them quite a while to get to the dumps, and then the horses are frequently injured by nails or other articles cutting into their hoofs and legs.

If Mr. Schwartz's plan is looked upon favorably by the City Council several trucks will be purchased by him to alleviate these conditions. The wagons will start out early in the morning as usual, but will be followed up by a truck, to which will be attached several empty wagons.

When the first wagon has been filled or nearly so it will be met by the truck, which takes the loaded wagon in tow and leaves an empty wagon. The horses or mules will be transferred to the empty wagon and the work of collecting the refuse, garbage or dirt will proceed without delay, while the motor truck pulling the loaded wagon and two or three empties will continue on its way meeting other filled wagons. When it has two, three or four loaded wagons in tow it will proceed to the dumps, where the refuse will be deposited.

This will allow the work of collecting garbage and refuse to progress without any delay caused now by the wagons being forced to make the trips to the dumps and returning to the districts whence they came.

RESERVE OF WOMEN DRIVERS

NEW YORK CITY, Aug. 11—For service in case of war a woman's motor brigade is being formed here as an adjunct to the National Guard by the American Defense Society. The brigade will serve in the same manner as the English women are serving now, taking the men's places when they are called to the colors. There will be three divisions—motor vehicle owners, those who will learn to drive and others whose services will be available at all times.

TRUCKS AT COAST TRAINING CAMP

SAN FRANCISCO, CAL., Aug. 3—For use in the Citizens' Military Training Camp at Monterey, Cal., and for the transportation of supplies from San Francisco some thirty motor trucks of various makes and capacity have been recruited. The distance which the trucks have to cover in the haul from the Golden Gate to the camp is some 130 miles.

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Maryland Passes Unfair Truck Law

Unjust to Solid-tired Vehicles —Five-Ton Truck Fee $32

BALTIMORE, MD., Aug. 2—Maryland has gone Massachusetts one better in discriminatory legislation against the motor truck. On July 1, 1916, a new motor vehicle law quietly went into effect in this state requiring solid-tired vehicles to pay $8.00 for the first ton of carrying capacity or fraction and $6.00 for each additional ton, whereas pneumatic-tired vehicles pay 50 cents per horsepower or fraction. Trailers are charged a flat rate of $5.00 regardless of capacity.

Under this law a pneumatic-tired 1½-ton truck of 22½ horsepower would pay $12.00 license fee. If on solid tires it would pay $14.00. A 3-ton truck of the same power on pneumatic tires would pay the same $12.00 as the 1½-ton truck, whereas if it were on solid tires it would pay $20.00. A 6-ton solid-tired truck would pay $38.00, while a 6-ton trailer would pay but $5.00.

That the law is a gross discrimination is shown by the fact that a trailer which may have steel tires of narrow width and may carry heavy loads may be operated at a license charge of but $5.00 a year, whereas a motor truck, which must run on rubber tires and which therefore must not exceed 850 pounds per inch of width, is forced to pay an excessive fee. A touring car of high speed capability whose pneumatic tires at such high speeds have a very destructive effect upon the road, due to the suction, pays very much less than a heavy motor truck whose broad-tired, slow-moving wheels often prove of more benefit than detriment to the road.

The effect of the law is likely to prove especially mischievous in that it will cause merchants to purchase trucks of small capacity and run them severely overloaded so as to escape the excessive tax. There is only one alternative but it is too much to hope that truck users will take it. That is to fit pneumatic tires of large size to big trucks.

CURB BUCKEYE JAY-WALKERS

COLUMBUS, OHIO, Aug. 3—The Columbus Automobile Club is backing a traffic ordinance which has been favorably reported by a special committee, which will repeal all existing traffic regulations and put all rules into one law. Several conflicting provisions made it necessary for the codification of the traffic regulations.

The ordinance will provide that all traffic, automobile, horse-drawn and pedestrian, must obey the crossing rules and no jay-walking is allowed. Stiff penalties are provided for all traffic which fails to obey the law. Headlights must be dimmed. No change is made in the regulations relating to speed, as that is controlled by the State law.

CALIFORNIA CITY BANS TRUCKS

LOS ANGELES, CAL., Aug. 4—The Motor Truck Club of Southern California is contesting in the lower courts the enforcement of an ordinance of the City of Anaheim. This ordinance is patterned after one passed by the City of Venice with the intention of throwing difficulties in the way of operation of jitney buses between the City of Los Angeles and the beach resort, which has been built up and is extensively advertised by an electric railway system.

The Anaheim ordinance imposes a license fee of $40 upon every truck operating in the city. The permit covers a term of 6 months. Recently the operator of a truck belonging to a freight-hauling contractor of Los Angeles was arrested during his single entry into the City of Anaheim to make a delivery, compelled to take out one of these licenses and pay the $40 fee. As the enforcement of the ordinance on this basis, as is proposed, would isolate Anaheim from surrounding towns, as far as motor truck hauling is concerned, and the successful enforcement of the ordinance would be probably followed by similar enactments in other towns subject to railroad influence, the Motor Truck Club of Southern California proposes to contest the matter if necessary through the courts of final resort. The case is being handled through the club's attorneys, Riddle & Cheroske of Los Angeles.

REPUBLIC REGAINS SWINEHART

YOUNGSTOWN, OHIO, Aug. 2—B. C. Swinehart, for the past 3 years manager of the Philadelphia branch of the Republic Rubber Co., has been recalled to the main factory of the Republic company at Youngstown, where he will take charge of the solid tire sales. Before coming to Philadelphia Mr. Swinehart was successively manager of the Cleveland branch of that company and manager of the truck tire department at the factory.

H. D. Worthington, assistant manager of the Philadelphia branch succeeds Swinehart.

NEW CREAM CITY FORGE PLANT

MILWAUKEE, WIS., Aug. 2—The John Obenberger Forge Co. has been organized here recently and has erected a new drop forge plant at West Allis, Wis., an industrial suburb of Milwaukee. The Obenberger company will not only make smooth forged parts, but will maintain facilities for rough turning them or for finishing them complete ready to assemble. Drop forgings will be made up to 100 pounds or hammered from billets in larger sizes. Motor parts will be specialized in.

MORE ROOM FOR DETROIT S. A. E.

DETROIT, MICH., Aug. 3— The headquarters of the Detroit section of the Society of Automobile Engineers have been moved to more spacious quarters at 706 Kresge Building.

ARMY APPROPRIATION BILL PASSES SENATE

WASHINGTON, D. C., Aug. 2—The army appropriation bill, carrying $312,000,000, was passed by the Senate without a record vote. The measure, as passed by the House, carried only $150,000,000, and will now go to conference for an agreement. Among the largest appropriations was one for armored automobiles amounting to $1,000,000.

Army Heads Discuss Civilian Trucks

S. A. E. and N. A. C. C. Men Meet at War College

WASHINGTON, D. C., July 31—Another meeting was held this week at the War College here to discuss plans for mobilization of troops and supplies in time of war, particularly so far as civilian organizations are concerned. Major Palmer E. Pierce of the General Staff Corps presided at the meeting, Lieut. Col. Chauncey B. Baker being present to represent the Quartermaster General's office. Representatives of the Naval Consulting Board, the National Automobile Chamber of Commerce, the Society of Automobile Engineers and the American Automobile Assn. committees were in attendance.

Information is being collected as to just how many government departments need a large motor truck equipment, in order that suitable specifications can be developed for each type of truck required. The Truck Standards Division, as well as other Divisions of the Standards Committee of the Society of Automobile Engineers, will, as in the past, take a leading part in this work. Serious attempts will be made to develop specifications of proper length, that is, neither too long nor too short, covering adequately the requirements of the government, which it is felt will eventually harmonize to a greater extent than has been expected heretofore with the needs of private users of commercial vehicles. Some well qualified experts feel that within 2 or 3 years the commercial product will approximate what according to the best opinion will be suitable for operation in all except special cases of government service. This is undoubtedly the best line of procedure, as it is not likely that a subsidy plan will be established in this country in connection with truck manufacture.

Trucks Severely Tested

It is agreed that the tests to which trucks have been subjected on or near the Mexican border are the most severe that have been had in any part of the world. The conditions of service have been abnormal in that the lines of communication have been maintained without the use of railroads. The performance of some of the trucks has been wonderfully good, but there is room for further beneficial specification in various respects. The necessary engineering study is now being made, many of the S. A. E. members going to the Mexican border to view at first hand the unusual conditions of weather, sandy grit and alkali encountered.

The development of suitable tractor types of motor vehicle will also be given attention.

Regulations are being prepared for use in the organization of officers and enlisted men of the Reserve Corps recently authorized by Act of Congress. There will be a mobilization of the reserve organizations of a fortnight's duration each year. Reserve Corps officers will be appointed in sufficient number to make possible the assembly of troops at local points and transporting them to strategical points.

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Opportunity Beckons the American Motor Truck in South America's Large Expanses

Part II

Buenos Aires and Brazilian Coffee Lands the Best Fields—Smaller Chances Elsewhere—Rio Not Good Market

BUENOS AIRES, June 30—The last issue's first article on the motor truck situation in South America gave only some general impressions of the country, the large expanses in such countries as Brazil and the Argentine, and a few of the high spots in truck possibilities. Before looking closely into some of these different sections it may not be amiss to interject a few words of general advice with regard to the market there.

1. Buenos Aires and the Argentine offer the biggest field to-day and should be the market first to be exploited, because finances are better there than in Brazil; and if the prices of wheat go up, as it is certain they will, particularly if there is any crop shortage in the U. S. A., money conditions will be less stringent. This will result in good selling conditions. Buenos Aires is the biggest city in South America, and yet further back in the use of motor trucks than Rio, Sao Paulo and Santos in Brazil, and further back than Montevideo in the small country of Uruguay. Buenos Aires should be the greatest motor truck center in South America, and it will be such in perhaps the next 5 years. There is bound to be a big demand. At present the high price of gasoline is a serious handicap, but I think that will diminish in perspective when the great earning capacity of the motor truck is more fully known. Educational work has to be done; but that kind of work has to be done in any truck sales field, with the possible exception of war orders.



Typical South American cart for city use which will have to be replaced by motor delivery vehicles. The cost of an outfit of this nature in a city like Buenos Aires varies greatly. A good cart horse costs $125 to $140 and a cart will cost from $350 to $600, according to its load capacity and finish. These carts all have 60 or 62-inch tread

Rio Not Promising

2. Rio de Janeiro is not a good market to-day, as the city is already filled with costly European trucks and finances are not good enough to warrant any U. S. A. maker wasting much time on the Rio field at present. The Rio field is purely a local one—that is, for the city only—as Rio is situated in the heart of a small federal district which is all mountains. You could not drive a motor truck out of Rio for 40 miles. Recently the Jeffery Quad tried to make the trip from Rio to Petropolis, the summer capital of Rio and only 60 miles up in the mountains. After trying 3 or 4 days it covered only 35 miles of the trip, and then returned. As nearly as I can learn a motor vehicle has never made the trip to Petropolis, and the only way you can get there is by train. There are many business men of Rio who live in Petropolis in the summer season and come by train to their offices every day. With outlying road conditions such as these, you see that the only field for trucks at present is within the city of Rio itself. There are over 500 trucks of all capacities there now, to which are being added every week passenger cars that have been converted into 1500-lb. delivery vehicles.

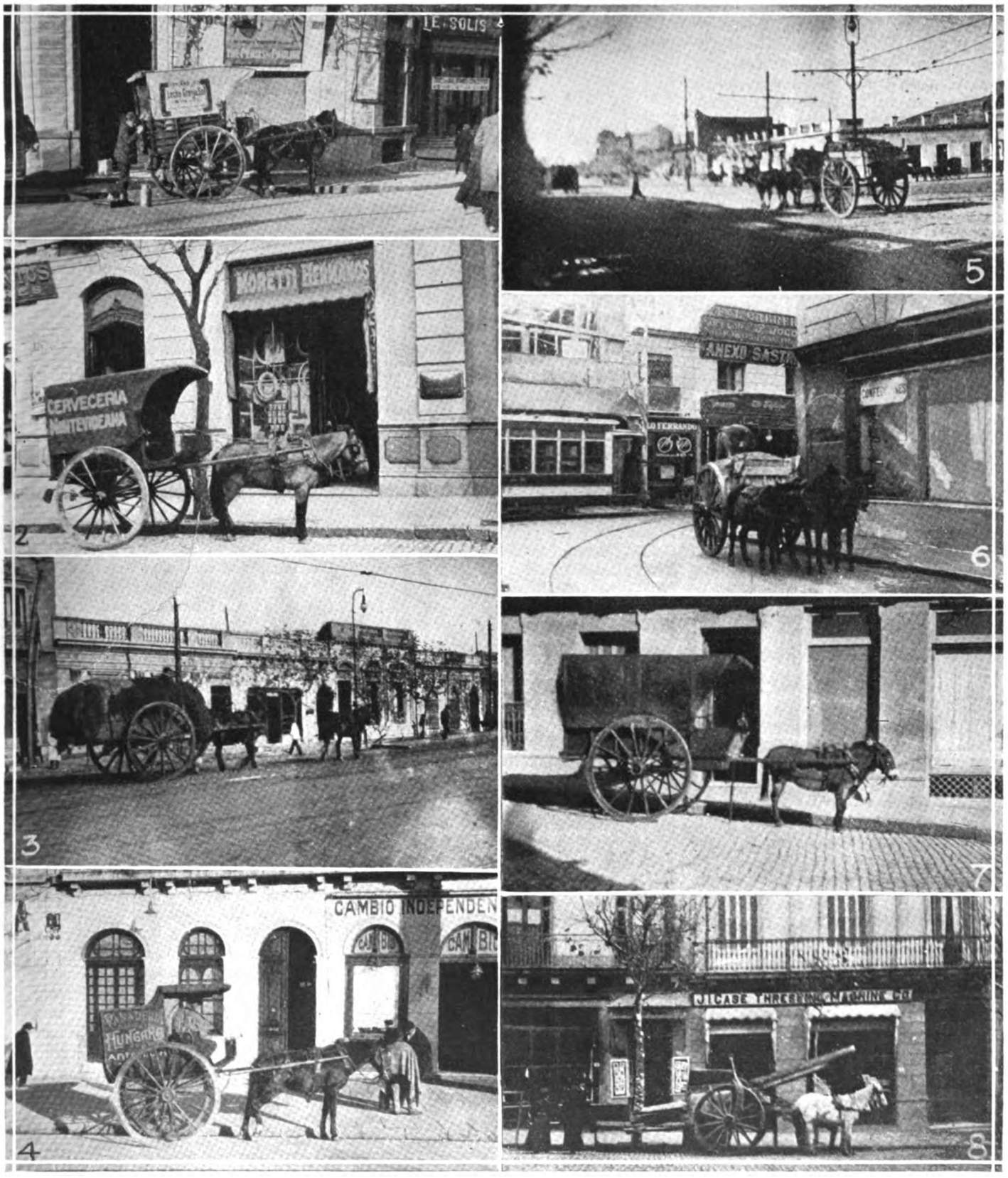


You see many Argentine meat carts of this kind with a waterproof cover. In several of the cities, garbage carts are made with similar tops

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Typical Carts of Argentina, Brazil and Uruguay

Photos taken on streets of Buenos Aires, Montevideo, Rio de Janeiro and Sao Paulo in June, 1916.



1—Milk cart used in Montevideo. Each city has literally hundreds of these carts. A light motor delivery vehicle could be used

2—Cart for delivering beer seen in Montevideo. Bottled goods are handled in this cart. Carts for the barrel trade are generally larger, with two or three horses

3—Two-horse cart on a street in Buenos Aires. Manure carts of this type with horses hitched in tandem are common. Note the length of street occupied by the cart and two horses

4—Carts of this type are very generally used by caterers and bakers

5—Three-horse cart in Buenos Aires with load of hides. This cart carries a 2-ton load. The horses are hitched side by side

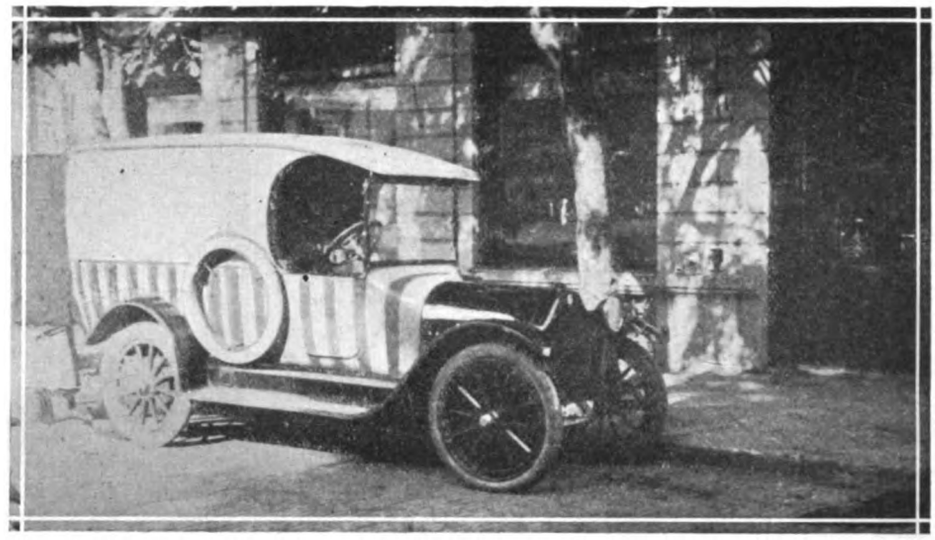
6—Three-horse municipal garbage cart in Montevideo. In Buenos Aires the garbage wagons have four wheels instead of two. The wheels are not over 36 inches in diameter

7—Grocery delivery cart in Sao Paulo, Brazil. The tarpaulin can be removed in dry weather

8—Loads of every description are carried on carts, this one being loaded with lumber, ladders and other equipment of a carpenter

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There is one respect in which the Rio field must not be lost sight of, namely, that Rio is the federal capital of the United States of Brazil, which in area are as large as all of the U. S. A. But Rio is more than the political capital; it is largely the business capital, and for that reason Rio is the best center in which to locate your Brazilian business. This is because all business men from all parts of Brazil come to Rio, just as the business men in the U. S. A. go to New York or Chicago, or the New Englanders go to Boston. Rio is a combination of politics and capital. It can be called the political and the financial capital of Brazil. In this respect it combines our own Washington with New York or Chicago.



Studebaker delivery vehicle used by one of the largest department stores in Buenos Aires. Recently the Studebaker company sold thirty vehicles of this type to one store. The Buenos Aires business merchant is fond of fine appearance and you will note the broad striping. The colors are not loud, as you might imagine, but are very well chosen and are as impressive as on a substantial limousine

Rio Business and Political Center

Because of this situation Rio offers a greater field for serving Brazil than would at first appear. The twenty states comprising the United States of Brazil have no free trade among themselves. When you ship out of the State of Sao Paulo to Matto Grosso you pay an export tax. There is this export tax on all goods of any nature shipped from one Brazilian state to another. But there is the usual exception, and that is the federal district in which Rio is located. So if you locate your business in Rio you can establish your depots there and then can ship into any of the other twenty states without the export tax. This is why Rio is the logical center for all Brazilian business, particularly if you propose to handle all of Brazil from one center.

To-day Sao Paulo is a much better retail market than Rio for U. S. A. goods and it would seem good policy, perhaps, to establish first in Sao Paulo. You can establish in Sao Paulo, but only for the State of Sao Paulo, for if you wished to ship from Sao Paulo to the great State of Minas you would have to pay your export tax.

3. There is a good truck market in the City of Sao Paulo, which is in the center of the State of Sao Paulo, the wealthiest State in Brazil and perhaps one of the richest and finest sections in all of South America. This State is largely given over to coffee, in fact, is the greatest coffee-producing area in the world. It is a most progressive center and the business men of the State are noted throughout all of South America for their business methods and business honesty. Not only can many trucks be sold in this city of 500,000, with its well-paved streets, but already many trucks have been sold in the coffee country and thousands more will be sold there in the next 5 or 10 years.

Good Roads Coming

True, roads are very lacking in the coffee country, but that is not a serious obstacle; it is only a temporary one. The road-improvement movement is already under way. These coffee people are wealthy. They operate huge areas and are accustomed to machinery. Any U. S. A. merchant entering the South American field should look into this section first, so far as Brazil is concerned. It offers the greatest possibility of all Brazil. U. S. A. passenger cars have been selling nearly a hundred times better there than in Rio. U. S. A. motor trucks should also find an excellent market there.

Santos offers no field for the motor truck to-day. Santos is only a port for Sao Paulo and the coffee industry. It is an excellent port. There are in Santos to-day too many motor trucks. One concern has fifty-four German Daimlers which it has had for 5 years. That concern is the largest teaming corporation in the city, and in addition to these trucks has 500 horse and mule carts.

The motor trucks were all used to haul coffee from the railroad depot to the coffee warehouses. All of the trucks were in use up to the war, but business has fallen off since then to such an extent that practically all of the trucks have not been taken out of the huge garage for a couple of years. Generally one or two are in use every day. The coffee is now being handled by horse and mule carts, as the transportation company found it cheaper to lay off the trucks than the mules and horses. The latter had to be fed whether working or idle, but not so with the trucks, as storage space did not cost anything except for rent and taxes, the company having its own huge garage, where all of its motor trucks and horse carts are stored.

There was another large motor truck transportation company in Santos that had fifty De Dion Bouton 4-ton trucks, but it went into receivers' hands several months ago. The trucks are now being taken by the different creditors and many of them are using them in their own businesses. With this situation existing there is little, if any, use of bothering with Santos.

To reach Sao Paulo you have to ship



A Renault 3-ton truck used to deliver mineral water in Montevideo. You see many Renaults with bodies of this style in different South American cities. As all South American cities have well-paved streets, the cities offer favorable opportunity for the use of motor trucks of all capacities

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Five-ton Daimler truck in Santos, Brazil. Santos is the great coffee seaport, and these trucks are used to transport coffee from the railroad depot to the coffee warehouses, where the coffee is cleaned, sorted and bagged ready for loading on steamers. The warehouses are along the wharves. Automatic loaders carry the sacks from the warehouses onto the boats

your trucks to Santos and thence drive them over the new road built to Sao Paulo, or you can ship them by train.

One of the finest railroads in all of South America runs through Santos to Sao Paulo. It is the wealthiest railroad in the world for its mileage, and has the finest equipment to be found in the world. The laws of Brazil will not let the corporation declare an annual dividend beyond a certain figure, and it is often a task for the company to find ways of expending its surplus cash to avoid the government taking funds in the form of excess dividends.

Transport in Coffeeland

Leaving Santos, which is on the water level, the railroad climbs to the top of a plateau 2000 ft. high, and this is done in a few miles. A cable railroad system is used to mount the incline. The usual train is divided into trains of three cars each, which travel as a unit. A train of three cars going up balances a train of three cars coming down, and as the cable system is divided into a series of divisions, there may be a dozen trains of three cars each making the ascent and as many making the descent. Over this road all of the coffee is transported. It has been suggested that with the new road between Sao Paulo and Santos coffee can be transported by motor truck, but it is doubtful if this will be done, as the coffee is brought from the coffee land a day's trip further inland than Sao Paulo and it would not be profitable to use trucks. The period of getting the coffee out is relatively short and the truck equipment would have to be large to care for the peak load. Much of this truck equipment would lie idle the remainder of the year. There is a good truck opportunity on the coffee plantations, but the work is largely transporting coffee to the railroad stations and general plantation work.

Montevideo Worth Developing

The City of Montevideo in Uruguay offers only a limited field for motor trucks. The city has a population of 375,000, but the entire country has only 1,310,000 people. The city has well-paved streets, and while the old section has the usual narrow streets, there are literally a score or more of very wide modern streets, and more are being added each year. The city offers the usual truck possibilities for a place of that population. There is little inter-city work in the country, because there are not roads connecting the other important places, and the population of these inland places is not such as to warrant more than a limited truck business.

Through Uruguay are quite a few factories, not a few of which will require motor trucks. These will form the basis of a later article.

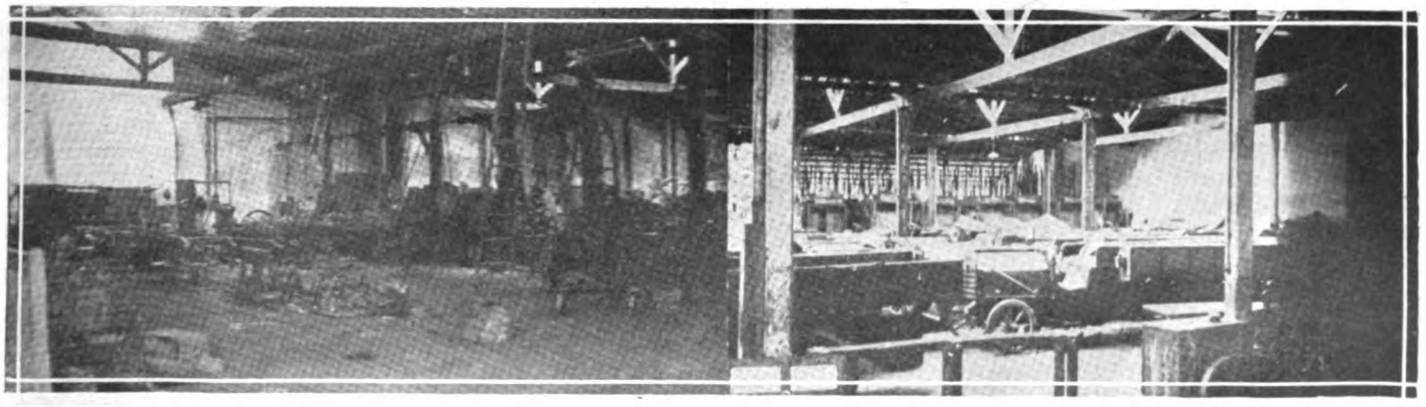
The country of Uruguay is settled on the same basis as Argentina, namely, by the large property owner, who has several hundred thousand acres of land. Here the land is largely used for grazing cattle and sheep. In the immediate vicinity of Montevideo the land is devoted to agriculture, but even here the truck possibilities are limited. In Montevideo the beef-slaughtering trade is an important and growing one. There are two large packing interests, one owned by Swift & Co. of Chicago. Motor trucks can figure in the local meat distribution to the city.

Uruguay Needs Light Trucks

In Montevideo are quite a number of motor trucks to-day. There is a field for limited sales, but the biggest market here is for the light delivery vehicle. The typical South American cart is seen nearly everywhere, and a light delivery car of 800 to 1000 lb. capacity should have a good market here. The high price of gasoline is the only factor that at present will work against it.

With this general review of the truck selling possibilities we can now turn to the City of Buenos Aires as offering the greatest possibility for truck sales and look more closely into conditions here.

Buenos Aires, the most promising market of any in this wonderland of opportunity, will be discussed in the next article of this series. The results of an investigation conducted, in co-operation with a prominent American bank, among 800 firms in that city will be analyzed with astonishing results.



These are two views of the inside of a large transportation company's garage in Santos, Brazil, which has fifty-four Daimler trucks used for transporting coffee. At the left is a view of the repair department equipped to do any repairs up to making forgings, cutting gears, case hardening, etc. At the right are seen a few of the trucks. All are fitted with bodies as shown. At present these trucks are all idle due to the business depression and the fact that the company must use its horses as they have to be fed, whereas the high price of gasoline makes it more profitable to store the trucks

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Ford Adapters Designed to Produce Vehicles of 1-Ton Capacity at Low First Cost

Part I

Devices May Be Divided Into Five Classes—All Except One Increase Ford Wheelbase to Permit of Longer Body

DESIGNED to transform Ford chassis of a nominal carrying capacity of 800 lb. into trucks of 1-ton burden, the twenty-eight different makes of Ford attachments or adapters now on the market are all built with the common purpose of producing such a vehicle at a lower price that that at which even the cheapest of the conventional 1-ton stock truck models can be purchased.

Although differing in the details of construction and in the manner in which the power is transmitted to the rear wheels, all Ford adapters except one type have a common characteristic in that the wheelbase of the Ford chassis is increased in order to enable a longer body to be fitted.

Five Classes of Adapters

The various types of Ford adapters may be divided into five main classes, according to what portions of the Ford frame and rear-end assembly are retained in the converted vehicle.

1. The first class may be considered as that in which the Ford frame is cut at some point near the center and an additional section of frame fitted, the Ford rear axle and spring being used by the employment of an additional section of propeller shafting of the same length as that of the frame section added. An alternate method in the same class employs a frame section attached to the rear end of the Ford frame, the Ford rear axle being moved back underneath the rear end of the extension by fitting an additional length of propeller shafting in the line directly aft of the motor.

Ford Wheelbase Not Increased

2. The second class is that in which the Ford wheelbase is not increased, but in which the Ford axle is used, together with steel wheels with housings carried on roller bearings independent of the axle. Supplementary side springs attached to the body are provided to transfer the additional load carried to brackets on the wheel housings and thus directly to the steel wheels themselves.

3. The third class consists of a telescoping or overlapping frame, carrying at its rear end a conventional chain-driven truck-axle assembly. The rear wheels are driven by side chains through the employment of the Ford axle as a jackshaft by simply replacing the rear wheels usually fitted by small driving sprockets.

4. In the fourth class, the Ford rear axle is used as the jackshaft of an internal-gear-driven axle in which all the other parts of the assembly are furnished in a unit with a telescoping or overlapping frame attached to the regular Ford frame. In this type the Ford axle is not cut, it being attached to the solid axle of the assembly by means of two brackets, one on either side of the central housing. Of course, the regular Ford rear wheels are removed and replaced by pinions, which mesh with large internal gears fitted to the solid-tired truck wheels that form a part of the rear assembly.

Makers of Ford Adapters

Ames Motor Car Co., Owensboro, Ky.
Automobile Mfg. & Engineering Co., Detroit.
Chain-Ton-Ford Co., Philadelphia, Pa.
Davis Mfg. Co., Los Angeles, Cal.
Dearborn Motor Truck Co., Chicago.
Detroit Truck Co., Detroit.
Wm. J. Forbes, Boston, Mass.
Franklin Two-Way Converter Co., Chicago.
Hayes-Diefenderfer Co., New York City.
Hudford Co., Philadelphia, Pa.
Iowa Motor Truck Co., Ottumwa, Iowa.
Jewett Car Co., Newark, Ohio.
Maxfer Truck Co., Chicago.
Motor Accessory Distributing Co., Boston, Mass.
Rayford Co., Philadelphia, Pa.
Redden Motor Truck Co., New York City.
Rothweiler & Co., Seattle, Wash.
Scott Machine Wks., Seattle, Wash.
Simplex Truckform Co., Chicago.
Smith Form-A-Truck Co., Chicago.
Swedish Crucible Steel Co., Detroit.
Truck Attachment Co., Seattle, Wash.
Trucktor Mfg. Co., Chicago.
Union Truck Mfg. Co., New York City.
Utility Motor Truck Co., Chicago.
Woodward Truck Attachment Co., Seattle, Wash.
Wright Truck Attachment Co., Seattle, Wash.
Xtend-A-Ford Co., Philadelphia, Pa.

5. The fifth class is that in which the entire Ford rear axle is eliminated and replaced by a complete rear truck axle assembly, together with some form of telescoping or overlapping frame. In this class the final drive is either by worm or internal gears.

It is the purpose of this article to list the manufacturers of Ford adapters and to point out the general characteristics of the five classes as outlined, reserving for a second installment short descriptions of each make and a specification table of all makes for easy reference and comparison.

How Added Strength Is Obtained

In the first class of adapters, in which the Ford rear axle and wheels are used intact in the converted vehicle, the additional load-carrying capacity of the latter is usually provided for by the introduction of additional leaves in the rear spring, a truss rod for the axle housing and the fitting of strengthening cross-members in the added frame section or in the Ford frame itself.

Several methods are employed of strengthening the Ford frame when the latter is cut at some point near the center and an additional section introduced. In one type the added frame section consists of channel members of slightly larger size than the Ford side frame. The former are slipped over the cut ends of the Ford side-members in the way of the break and the latter are then swedged into the added members and finally riveted in place. Truss rods extending from the front to the rear end of the lengthened frame are fitted by means of special clamps at each end, which make it unnecessary to bore any holes in the frame at these points. Each truss rod has three spacer arms, one at each end of the added frame member and the third in the center on a transverse strengthening member, which is also arranged to carry the thrust of the driveshaft, the added section of which is positioned between the cross-member and the motor.

Clamps Used in Some Types

In other types of the same class, both the added side frame-members and the truss rods are attached by riveted connections. In other types, in which the

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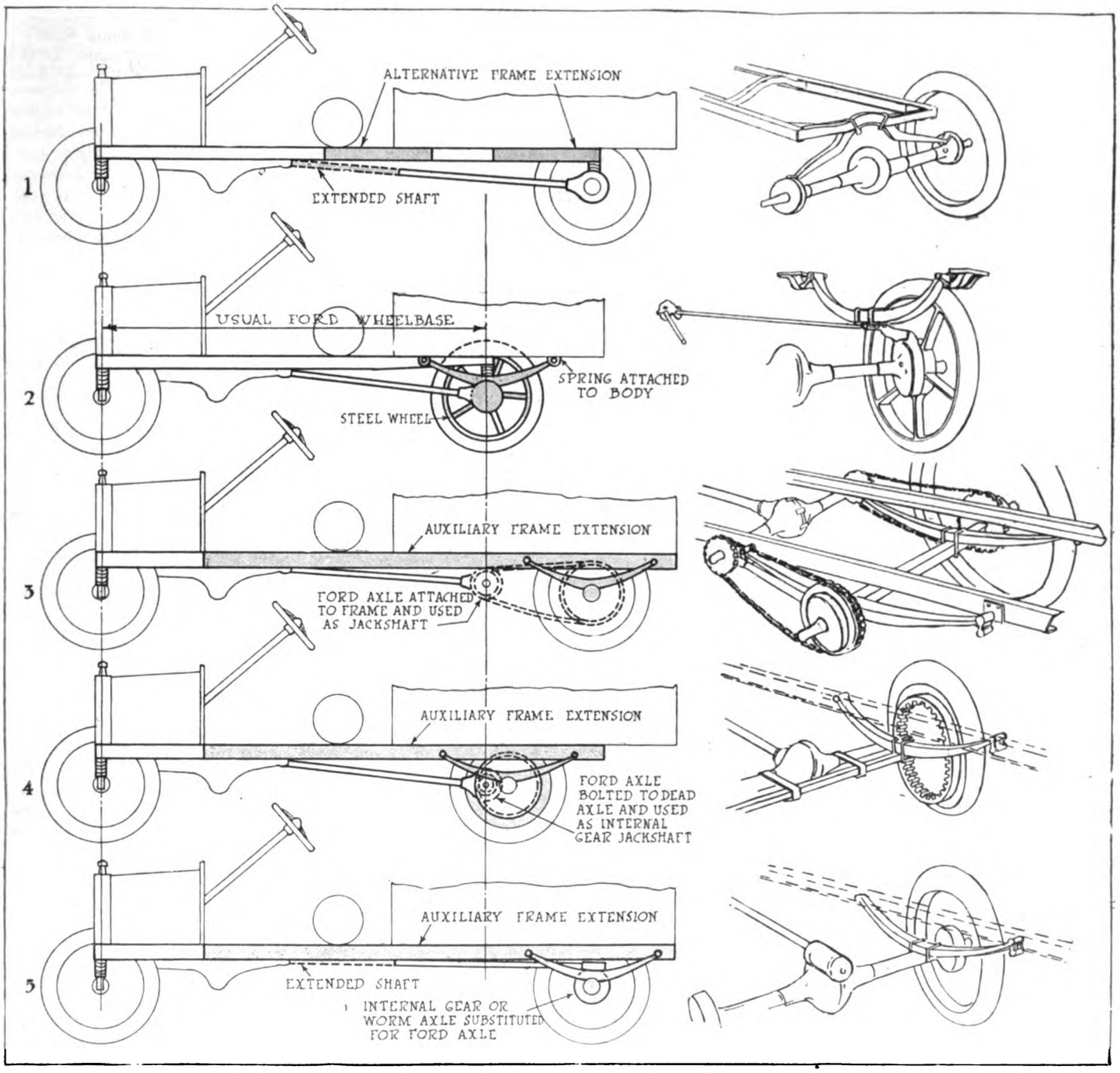
alternate method of attaching the added frame-members to the rear of the Ford frame is used without cutting the latter, the rear assembly is attached by riveting or by clamps to eliminate the necessity of weakening the Ford frame by boring holes in it. In each case an additional cross-member is attached to the Ford frame at a distance from the rear of the motor equal to the increase in the Ford wheelbase. This cross-member is sometimes riveted to the frame and sometimes clamped.

Rear axle truss rods are also usually fitted to strengthen the Ford axle. The additional piece of drivingshaft fitted in adapters of this class is usually furnished with an universal joint at the rear end, supported in the additional cross-member provided. Additional lengths of running-boards are also furnished.

Load Carried by Special Wheels

The second class of adapter employs the principle of carrying the load weight directly onto the hubs of steel wheels. This is accomplished by the use of a special housing on the wheel, carrying a set of roller bearings, in which the end of the regular Ford axle is inserted. An integral bracket on the wheel housing carries a spring pin, on which is pivoted an auxiliary side spring, both ends of which are attached to the body and not to the frame. The usual rear Ford spring is retained and connected with the wheel housing by shackles. By this means the weight of body and load is transmitted through the usual Ford spring and the auxiliary side springs direct to the wheel housings and thence to the wheels themselves. Auxiliary radius rods are fitted to neutralize the load strains and prevent side sway.

This type of wheel is offered in three



The five general types of Ford adapters, classified according to what parts of the Ford are retained in the converted vehicle, shown in elementary side and perspective sketches to indicate the changes made. The shaded portions indicate those parts which are added. Note that the Ford wheelbase is increased in all five classes except the second. In No. 1 the Ford rear axle and spring are retained. The wheelbase is increased by the introduction of a frame section either at some point near the center or at the extreme rear. An additional piece of driveshaft of the same length as the increase in the Ford wheelbase is used to transmit the power to the rear axle. In No. 2 the additional load capacity is taken care of through the use of steel wheels with housings carried on roller bearings independent of the Ford axle, which is used intact. Supplementary side springs attached to the body are employed. In No. 3 the Ford axle is ured as a jackshaft for a chain-driven rear-end truck assembly in unit with a frame extension. In No. 4 the Ford axle is employed as a jackshaft for an internal-gear axle unit. In No. 5 the entire Ford rear end is replaced by a truck frame addition and axle which may be driven either by worm or internal gears

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different sizes, one for pneumatic tires larger than those usually fitted and two types for solid tires of 28- and 24-in. diameter, respectively. The smaller-sized wheels are used to reduce the gear ratio between the motor and the rear wheels to take care of the greater load carried.

Most Makes Chain Driven

The greatest number of Ford adapter makes are of the chain-driven type, in which all or a portion of the regular Ford axle is used as a jackshaft, although it does not of necessity follow that there are more of this type in use than of the other four types. The added frame lengths of the chain-driven type are usually made of channel sections, some of which telescope the Ford frame side-members, while others are of greater width, some extending clear to the front end of the Ford frame before they are swung in to meet the latter. In this case a cross-member is usually provided in the added frame, this sometimes replacing the rear end cross-member of the Ford frame and sometimes being used in conjunction with it. In most of the makes of this class, two semi-elliptic springs are employed, although in one or more cases auxiliary rear end springs of the platform type are also used. The latter are designed to carry the light loads of approximately 500 lb., while for loads above that amount the weight is transferred to the side springs.

In most of the models of this type the Ford axle is used intact as a jackshaft by the replacement of the regular wheels by driving sprockets, although in one case two larger and longer jackshaft axles are provided, the regular Ford gears and housings being used, the latter being machined to accommodate the new axle shafts which are made necessary by the jackshaft hanger and sprocket construction.

The necessary gear reduction in adapters of this class is accomplished by the proper proportioning of the ratio between the driving and the driven sprockets.

Ford Axle Internal-gear Jackshaft

In the fourth class the Ford axle is used as a jackshaft for an internal-gear axle assembly, all the other portions of which are supplied in a unit with a tail-end frame member. Conventional semi-elliptic truck springs, dead truck axle and truck wheels are provided. The necessary gear reduction between the motor and the rear wheels is secured either by fitting smaller-sized wheels or by the ratio between the pinions mounted on the ends of the Ford axle in place of the regular wheels and the internal gears on the wheels. The side-members of the added frame are usually of channel section and overlap the regular Ford frame, being either bolted or riveted in place.

In the fifth class the construction of the adapters is much the same as in the third class insofar as the frame, spring and wheel members are concerned, although, of course, the elimination of the Ford axle as a jackshaft for an internal-gear or worm-drive axle changes the construction somewhat and renders necessary the use of an additional length of driveshaft. The frames are attached by either bolts or rivets. The elimination of the entire Ford rear assembly makes it necessary to carry both sets of brakes on the rear wheels.

Adapters Attached in Short Time

Aside from the mechanical construction of the five types, those of the various makes which use clamps or bolts instead of rivets for the attachment of the adapter may be removed from the Ford in a relatively short time, provided the discarded Ford parts in each particular case are not disposed of. Likewise, those which use some form of clamps for attachment and some of those which use rivets may be fitted to the Ford chassis in less than 1 day.

Most of the adapter makers supply only the adapter parts, leaving it to the purchaser to have the Ford converted under his own supervision and to dispose of the Ford parts eliminated, although at least one maker will furnish the complete adapted vehicle. When the Ford and the adapter are purchased together, the maker referred to retains the unused parts of the Ford and issues in lieu thereof eighty service coupons of a total face value of $30. These may be redeemed in the city in which the maker is located for repair work on either the Ford or the adapter, or for Ford parts at their catalog price. The service coupons are not valid after 1 year of the date of purchase of the converted vehicle. This system was devised for the purpose of taking care of the amount of repair work which might be expected during a year's operation of the vehicle, provided it was given fair treatment, the reason for this being that the Ford company voids its guarantee on any of its vehicles to which any attachments are fitted.

Motor Buses and Trucks Save Shoe Leather in Gotham Traction Strike

(*Continued from page* 9)

have braved the blue-nosed shark this summer. Accordingly they combined to organize a bus service between Queensboro Plaza in Long Island City and the beach.

But the nickel-chasing jitneer was not the only relief. Large firms, finding their employees absent on account of inadequate transportation, fitted rude benches to their trucks and established private bus services. The New York Telephone Co. ran a fleet of such vehicles between its various city exchanges and elevated and subway stations.

Other firms engaged suites of rooms in hotels near their places of business for the accommodation of help, some engaging quarters on the New Jersey side of the river, as tube and ferry service has not been affected.

Some firms paid $10 a day for options on sight-seeing buses should they be needed, agreeing to pay as high as $75 to $100 a day in case they were called into service.

Taxicabs, sight-seeing buses and converted trucks have been placed in service by such firms as the Western Union, Postal, National Biscuit, National Cloak & Suit, Adams, Westcott, American and Wells Fargo express, the Lawyers' Title & Trust Co. and the police department.

It was fortunate that a protocol had made peace in the ranks of the Fifth Avenue Coach Co. before the carmen went out, for the 150 Fifth Avenue buses have proven a great convenience to thousands.

With the more general adoption of motor haulage and its proven ability to rise to such emergencies as this one, car strikes may yet become futile; and this ability of the commercial vehicle to keep the wheels of local commerce turning in a local crisis may prove the solution of many difficulties in the event of a national railroad strike.

BLOOMINGTON TRACTOR SHOW AUG. 21

BLOOMINGTON, ILL., Aug. 5—The National Tractor farming demonstration is to be held at Bloomington, Aug. 21 to 25, under the direction of A. E. Hiltebrand. More than 100 different manufacturers of tractors, good roads machines and accessories will participate. About 700 acres of ground, a short way east of Bloomington, has been reserved for plowing demonstrations. About 100 acres will be plowed each day.

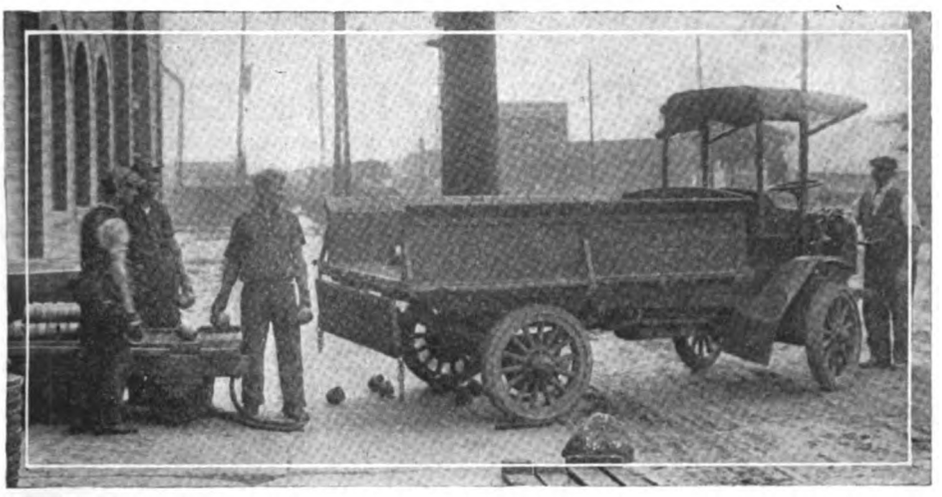
DIXIE HIGHWAY MEET POSTPONED

CINCINNATI, OHIO, Aug. 2—Since the first announcement of the Dixie Highway Exposition and Convention the date has been postponed until Oct. 20 in order to take advantage of the christening tour of the eastern route under the auspices of the Dixie Highway Assn.

MORELANDS FOR U. S. A.

SAN DIEGO, CAL., Aug. 3—The quartermaster's department at Fort Rosecrans has just accepted delivery of a fleet of Los Angeles-built Moreland motor trucks.

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One of the Bliss 2-ton Autocars being loaded with shell parts for transference from one of the plants to another for different machine operations

Truck Characteristics of Speed and Ability Make Munition Maker Motorize

(*Continued from page 7*)

the Bliss shops, their employment at the former location did not enable the unloading time to be reduced to the same extent because of the fact that the boxes could not be left on the platform after unloading, but had to be taken up on elevators. Sometimes these were carrying other materials and accordingly the Bliss trucks had to wait for considerable periods before they could be unloaded.

Pierces Deliver Special Machinery

The 5-ton trucks not employed in munitions haulage are used to deliver the large units of special Bliss machinery from the company's main plant at Adams and Plymouth Streets while one or more of the Autocars are used for the delivery of small machine parts. This work covers a large area in the territory surrounding New York City. Deliveries have been made as far north in New York State as Poughkeepsie, about 80 miles from the plant, and others in the lower portion of Connecticut and in nearby portions of New Jersey. The trucks used in this work are equipped with conventional stake-sided bodies similar to that shown in the illustration at the bottom of page 7.

Trucks Save Money Hauling Torpedoes

Another class of the Bliss work in which the trucks have superseded the horses formerly used with good success is that of hauling finished Whitehead torpedoes to the Fall River Line pier on the lower Hudson river waterfront for shipment to the Newport, R. I., testing station. One 5-ton truck can make four round trips to the Fall River Line pier daily, carrying six torpedoes each trip, whereas the horse wagons formerly used made only one trip per day and carried only three torpedoes at a time. Thus it is seen that one truck can deliver the same number of torpedoes in a day that would require the use of eight two-horse wagons.

The trucks are garaged in the company's own building at the Fifty-third Street plant. During the first year of the foreign munitions contract, which is almost completed at this writing, the garage force consisted of the garage superintendent, his assistant and two mechanics, in addition to a crew of thirty-five drivers for the total fleet of eighteen trucks. The garage superintendent inspects each of the trucks every day and personally supervises practically all of the work done. He is a magneto expert and handles all of the repair work on those instruments. Even the minutest trouble on any of the trucks is attended to as soon as it becomes evident, so that small repairs are not allowed to develop into large ones. This course has resulted in the trucks being kept in such good condition that repairs are hardly ever necessary during the day. The two mechanics work at night. The garage superintendent lays out their work for them after his inspection of the trucks and by talking with the drivers. Tags with notations giving the work to be done are attached to the trucks requiring attention, so that none of the necessary work is overlooked.

The garage superintendent has worked out a novel method of showing graphically the condition of the motor of each of the trucks. A large sheet of cross-sectioned paper is used. This is divided into nine rectangular blocks, three horizontally and three vertically. Three vertical blocks are used for the records of one truck, so that the large sheet serves for three trucks.

Gasoline Records Kept on Charts

Vertical lines drawn through each of the three blocks in a vertical column represent the days of the month, from 1 to 31. Horizontal lines in the top block represent the mileage covered. Similar lines in the second block represent the gallons of gasoline used and those on the bottom block the pints of lubricating oil. As used, the mileage, gallons of gasoline and pints of oil consumed each day are located by the intersections of the vertical and horizontal lines in each respective block. Curves are then drawn between the points from day to day. These curves indicate graphically the fluctuations in the mileage covered and the amounts of gasoline and oil used each day. Average curves for each week are plotted on each of the blocks by dividing the total mileage by the number of days. Then by dividing the average mileage for any period less than a month by the gasoline and oil consumed in the same period, other curves are drawn which show graphically the average miles per gallon of gasoline or pint of lubricating oil used. These averages indicate the condition of the motor valves and show when the carbureters need adjustment or cleaning without even looking at the motors. The use of the system has enabled a very close watch to be kept on the trucks' motors, calling immediate attention to the necessity of valve grinding, carbureter adjustment or poor operation on the part of the driver if the average gasoline consumption is too high.

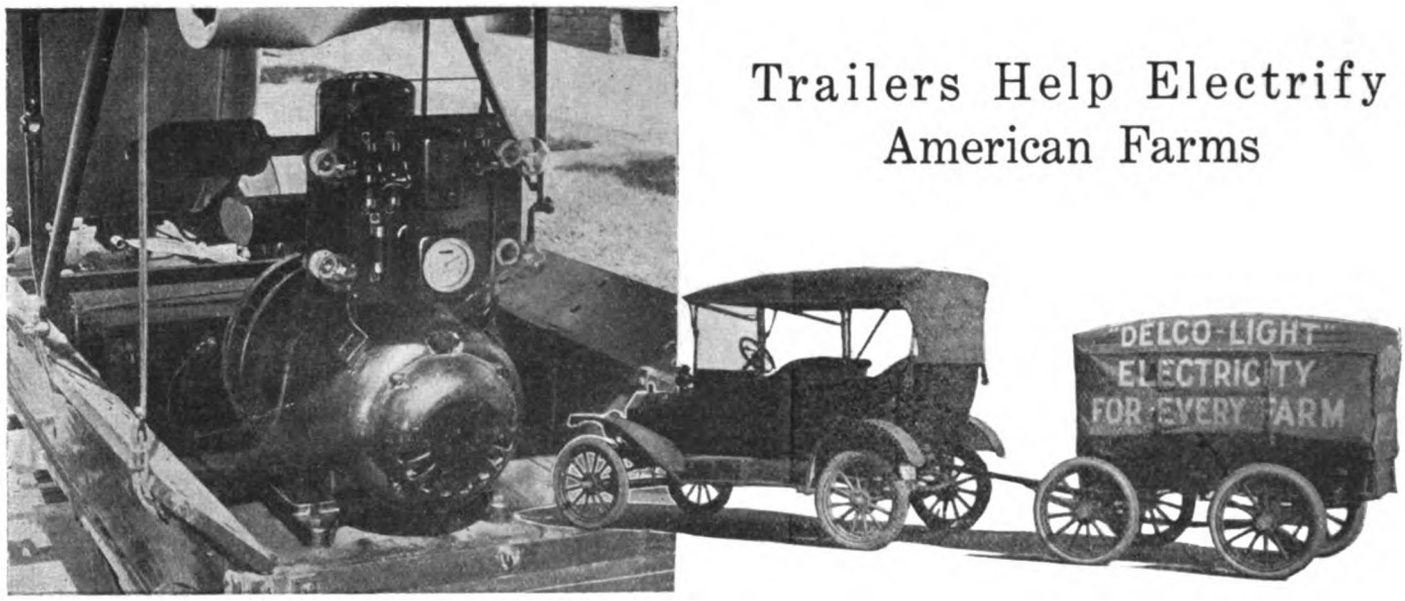
Charts Would Aid Bonus System

The charts have also proved an easy means to calculate the average gasoline and oil consumption per mile for each of the trucks for the purpose of introducing a bonus system based on those two items. Although this system has not been put into operation as yet, it is expected that it will be in the near future and money prizes awarded to those drivers whose vehicles have been run the greatest number of miles per month with the least consumption of gasoline and oil.

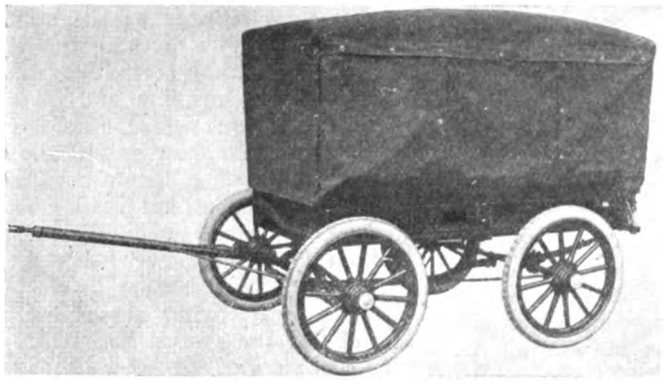
Approximately one-quarter of the Bliss truck drivers are men who formerly drove the company's horse wagons. They were trained by the garage superintendent and have proved very satisfactory, having had no preconceived notions of their own as to how the trucks should be operated and having had considerable experience in the handling of the Bliss company's goods.

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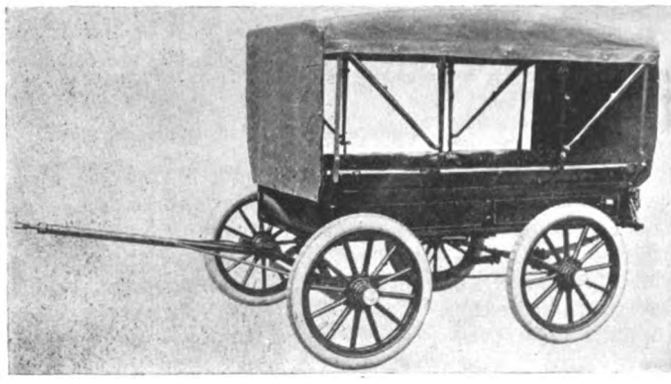
Trailers Help Electrify American Farms



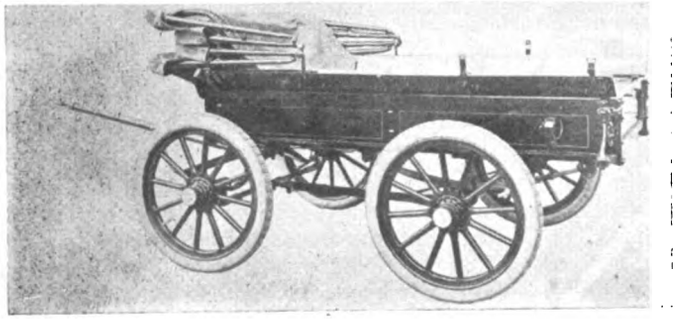
The Delco Light outfit installed in Miami trailer, showing complete outfit in tow of a Ford



Trailer with top up and curtains in place, a rainproof shelter for the outfit



The curtains removed, but the top still in place, showing some of the gear



Top down and whole of interior exposed. Note compact folding of the extension top

BACK to the Land—that is the movement, but the city men who are going back to the land are not going back to the farm life which their fathers left. They are taking city conveniences and modern methods with them. Responsive to the demand among farmers to-day for electric lighting and recognizing the difficulty of securing a reliable and economical source of supply, the Dayton Engineering Laboratories Co. has developed, through a subsidiary, the Domestic Engineering Co., the Delco Light system for farm lighting.

The marketing of this system is being undertaken by the direct method, over 1000 general agents and salesmen being in the field, traveling among farmers and installing the system. These travelers are using light touring cars. In demonstrating the outfit to farmers on their own premises, the Domestic Engineering Co., as a result of experiments conducted by its engineers, has recommended to them the use of a special four-wheeled trailer, mounted on pneumatic tires and arranged to be towed by a salesman's touring car.

This trailer, illustrated on this page, is the product of the Miami Trailer Co., Miami, Ohio, and is equipped with a folding extension top, similar to the type used on touring cars, equipped with dust- and rain-proof curtains. Ensconced in one of these trailers the lighting outfit can be hauled anywhere the salesman goes, protected from the sun and the elements. In a few seconds time it can be uncovered completely and set in motion. The trailer may be disconnected from the touring car and left standing while the salesman is making calls on which he does not require the use of the outfit. The outfit may be connected with the terminals of a wired house and left overnight to brighten the home of a prospective buyer, the salesman meanwhile returning to headquarters in the car.

There are endless possibilties in the trailer idea, but that is not all. To fulfill its mission properly, a trailer must be easy riding, it must not hamper the movement of the car, especially in turning, it must completely protect the outfit and must not induce skidding.

Toward achieving these ends, the Miami company has built its trailer on four wheels with Timken bearings in the hubs and Ford-sized tires on the rims. The wheelbase has been made short, 52 in., to provide a narrow turning radius, albeit the track is standard, and the body is swung low. This body is of the open express type with a tail-gate at the rear and the top affixed to the front. A small electric tail-light is fitted.

The body is 78 in. long, 38 in. wide and has 10-in. sides. The floor is 24 in. from the ground. A spring draw-bar provides against shocks being transmitted from the trailer to the car or *vice versa*.

The Delco Light plant is extremely simple in its design. It consists of a small gasoline motor, directly connected to an electric generator, and a specially designed storage battery.

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The plant supplies plenty of current for operating lights in all parts of the house, barns and other buildings on the farm or country place. In addition to operating lights, sufficient current is supplied for running a large number of small power appliances such as cream separators, churns, washing machines, vacuum sweepers, and even pumping systems for suplying running water to all arts of the house and barn.

The greatest help realized by the salesman with the Delco-Light-equipped trailer is his ability to give actual service demonstrations of what the plant will do. Many farm houses have been wired for electricity in the hope that some means of supplying it would be developed. When the Delco Light salesman comes to such a house, he asks permission to connect the plant on his trailer to the wires in the house, and leave the plant over night for trial by the prospects. Or, in case the house is not wired, he carries his own wires and simple fixtures into the house from the trailer, and places them where they can be of use to the farmer and his family during the evening and the salesman frequently returns the next morning to find a sale half made. A large number of these trailers are in use by Delco Light salesmen in different parts of the country.

How nearly the Miami trailer has come to supplying the need of Delco Light salesmen is indicated in the following report forwarded by the general manager of the Domestic Engineering company to all its general agents:

"The Miami Trailer Co. of Troy, Ohio, has seen fit to build a special trailer to carry a Delco-Light demonstrating plant, and we are glad to report that our tests with this trailer were very satisfactory.

"If you feel that you, or any of your men, can use trailers to advantage, we are glad to recommend this trailer to you as satisfactory in demonstrating the Delco Light plant.

"The following is a portion of the report of the tests as made by Mr. Dickey, our engineer, and other members of the Delco-Light factory:

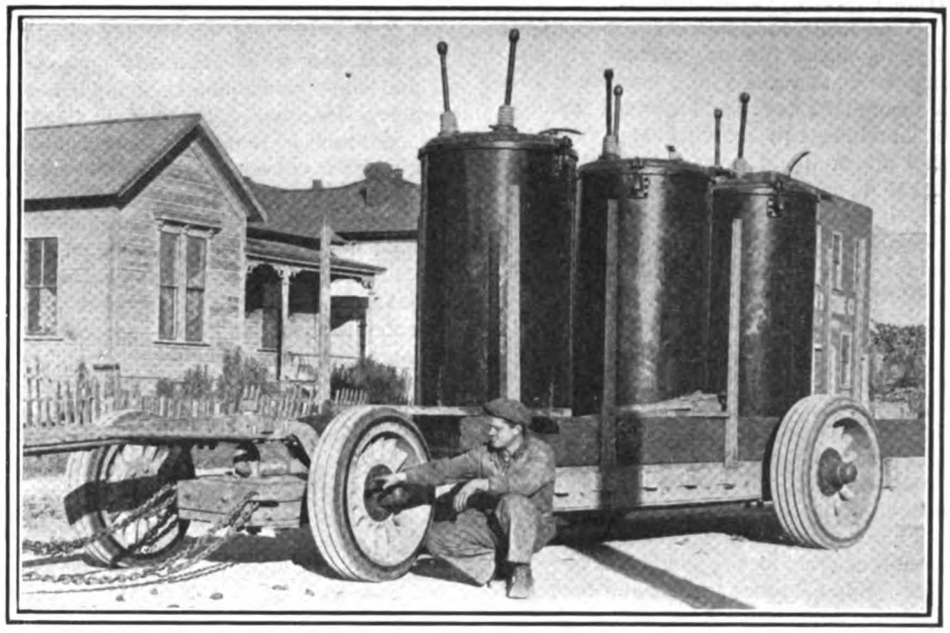
" 'Monday afternoon, April 24, 1916, we tried out the Miami four-wheeled, pneumatic tired, trailer equipped with a Delco-Light plant and 60-ampere-hour battery. We ran it over bumps, ruts, etc., at a 25 miles per hour rate, with the writer riding the trailer seated on the battery box. We also traveled 42 miles per hour on the Troy pike. The demonstrator for the Miami Trailer company turned his machine and trailer around in the road without difficulty. This trailer has approximately the same turning radius as a Ford. He also see-sawed back and forth across the road and car tracks while going at a reasonable rate of speed, and during this test we could not detect any skidding of the trailer wheels.

" 'After this the engine was started without difficulty and no smoke was visible from the exhaust, which shows that the oil was not splashed up on the cylinder head. The hitch is strong and durable and the large coiled spring they have in the coupling is a great advantage on this trailer. The top is made of regular automobile bows and the curtains are double lapped so that no dust can get inside.

" 'In conclusion will say that the trailer is practical as far as we are concerned.' "

Eighteen-ton California Trailer

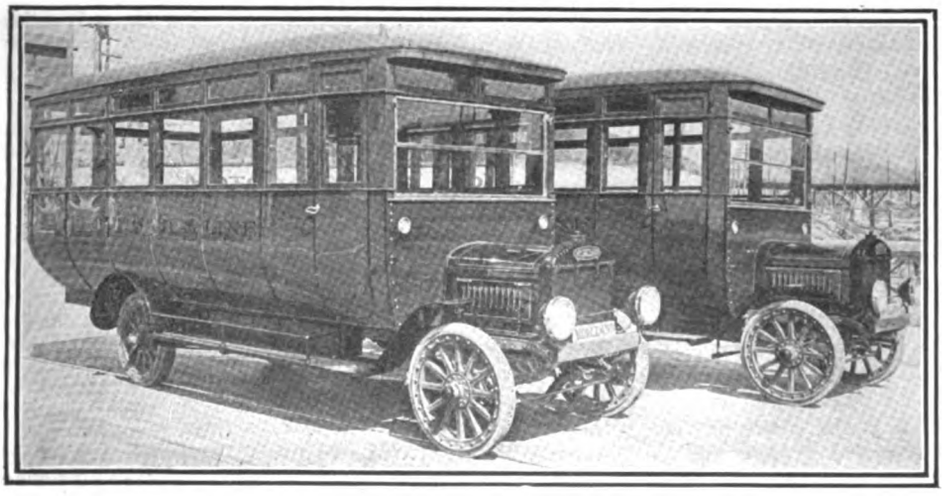
The Southern California Edison Co., has adopted an 18-ton trailer which is used in transporting heavy electrical equipment between the company's stations along the Pacific Coast from Santa Barbara to San Diego. This great trailer, designed by engineers of the Edison Company, was built by the Pike Auto Wagon Works, Los Angeles, Cal., and is especially adapted to the transportation of huge transformers and dynamos. The trailer is equipped with Firestone giant solid tires, 36 by 8 on the front and 42 by 12 on the rear.



Central station's low-bed, rubber-tired trailer hauling three transformers.—Note the yoke-and-eye turning connection on the front axle

Santa Barbara Buses Luxurious

Introduced in Santa Barbara, Cal., and following the most approved principles of street railway car design which have been the subject of gradual evolution and thorough demonstration in a business where for the last 4 or 5 years efficiency and economy have been the prerequisites of dividends; roominess, comfort, sanitation, a sightly outlook without any freak design, and at reasonable cost, are the considerations which have been given first call in these new buses delivered by the Moreland motor truck factory to Lloyd's Bus Co. of Santa Barbara.



New Moreland buses, patterned after street cars, but more carefully finished and equipped, used in Santa Barbara, Cal.

Superiority to ordinary street railway construction is evidenced by the interior and exterior finish in some points, the vibration stops against the windows, the comfortable accommodation for the driver, the ample illumination given by the overhead electric light and other points.

Each bus has a capacity for twenty passengers, besides special racks for suitcases and baggage. Automatic closing of the exits is effected prior to starting, and the doors cannot be opened while the car is running. Between the window and the top there is a curved panel on each side of the interior in which advertising panels may be inserted.

These buses are in service between the city of Santa Barbara and the town of Carpenteria.

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Electric Stevedores Promote Freight Terminal Efficiency

Industrial Truck Applications

By C. W. Squires, Jr.*

"IN freight transportation our transcontinental railways and our great steamship lines loom large in the public mind, and to the casual observer the four-horse dray and the motor truck come next in relative importance as transportation units.

"However, we must not overlook the handtruck, hundreds of thousands of which are still in use. These represent an annual expense in labor alone of millions of dollars, much of which is wasted from an efficiency standpoint.

"The electric industrial truck has been forging ahead rapidly, particularly during the past three years, because it fills a recognized need for improved methods of handling raw material and merchandise internally. Contrary to what is perhaps a popular belief, the economies which may be effected inside the freight terminal, inside the plant and the warehouse, are several times greater than those which may be effected in long-haul and road transportation.

"A sixty-car train as against one of forty cars may effect a long-haul saving of from 5 per cent to 10 per cent; improved methods as worked out by the use of motor trucks in street or road transportation may effect a saving of 15 per cent to 20 per cent. In the more efficient handling of internal freight, however, a saving of from 40 per cent to 50 per cent is not only possible but in many cases exceeded. This tremendous economy is due to the wise application of the proper industrial truck or electric stevedore.

Why Such Progress?

"The increasing use of electrically propelled vehicles is apparent to all who come in touch with freight terminals and manufacturing plants in general. When you stop to consider that a 1-ton electric will displace the handtruck at a ratio of fifteen to one, its rapid adoption obviously becomes inevitable so far as the progressive business man or corporation is concerned. It is the most elastic of all mechanical freight-handling devices, such as industrial railways, telpher systems and inclined elevators, and in contrast with these it reduces the investment to a point where there is almost no comparison.

"The principal types in extensive use at the present time are the baggage truck, both high and low platforms; factory truck, both elevating and fixed platforms; dock truck for level and heavy grade work; the tractor, or electric horse, for factory, yard and lumber tramway work; the crane truck, for towing, lifting and carrying on the hook, and various modifications of these types. All of the above have their individual applications for specific service and conditions. Perhaps the most widely known and the one with the most universal application is the standard medium-height platform electric stevedore manufactured in lengths of from 6 to 10 ft.

The Various Fields Covered

"In addition to its extensive use at rail and water terminals in many cities thoughout the country, the electric stevedore has found its way into thousands of manufacturing plants, textile mills, iron foundries, slate mills, fertilizer plants, cotton, sugar and tobacco warehouses, iron and steel plants, wire mills, paper mills and factories of endless classifications. Unquestionably a large percentage of electric stevedores in the service are test machines, yet the tremendous market possibilities in sight fail to keep pace with the *immediate need* for these little time- and labor-saving vehicles. One of the interesting things in their introductory use, however, is the fact that once they have demonstrated their efficiency in a new field they enjoy rapid adoption in parallel lines of business. Hence the development expense, so far as the market is concerned, decreases with each substantial increase in distribution.

"It is also interesting to note that fully 50 per cent of the prospective sales developed originate from those business men who have watched such trucks in service in the various fields; they grasp their possibilities and in their own mind adapt a similar type to the needs of their own particular business.

"A prominent New England manufacturer has replaced his industrial railway, torn up all tracks, replacing the locomotive cars with industrial trucks and the tracks with concrete runways.

"In handling hot forgings from the forge shop a handy pit has been prepared where cans of forgings are run directly onto the platform of the truck and carried distances varying from 500 to 1500 ft. to a similar pit used for unloading, thereby enabling the handling of these hot pieces where previously they had to be cooled before handling. These pits are also used for loading large and bulky freight where one man can do the loading instead of the operation requiring the services of two or three men. This same manufacturer handles a great deal of pig copper and pig lead, and here the loading and unloading time is an important financial factor. For this service an industrial tractor is used as a locomotive. Each tractor has three trailers; while one is being loaded another one is unloaded, and the third is in transit between the two points.

"A large stove manufacturer has removed all industrial tracks throughout the plant, including foundries, assembly shops and shipping room. This manufacturer has a private electric plant; and as this plant does not operate at night a double set of batteries is used, one set charging while the other is operating in the truck. On account of the severe congestion in the freight and shipping rooms, principally due to lack of elevator capacity, inclined runs were installed from the first to the second floor, the trucks negotiating these ramps without difficulty. Many of the hauls at this point are less than 200 ft. The trucks have paid for themselves many times over, and he is a good booster for this type of inside transportation.

"A prominent steamship company handling coastwise freights finds that its bulky packages can be loaded quickly, as the industrial truck will replace from five to eight men. The hauls range from 500 to 1000 ft. For smaller packages trailers are used. It has been found possible to use as many as three trailers with loads varying from 1000 to 1500 lb., each back of one of the industrial trucks. When used as a tractor to haul these trailers the industrial truck has replaced as high as ten to fifteen men.

"Another prominent steamship company handling coastwise freights accepts all outgoing freight at the street bulkhead, handling it direct from a receiving platform up to the gangplank of the vessel and into the hold of the ship. A large amount of incoming freight is also handled in the same fashion. The saving in this case is not only in the freight but in the repairs to the dock and the amount of freight possible to handle in a given space, also in the general satisfaction to its customers in the expeditious manner of handling the freight and the saving in delays for the truckmen.

In Manufacturing Pursuits

"A prominent iron and steel manufacturer in the East is using the industrial truck for loading box cars with the smaller product of this plant. These parts are loaded directly onto a truck with an overhead crane, run up a 25 per cent grade onto the loading platform alongside the box cars, and then into the box car. The loading position of this truck is directly at the bottom of the 25 per cent grade, and the truck must climb this grade from a standing start. As high as 2 tons have been handled in a single load in this fashion. One of the serious problems that has confronted this manufacturer is the handling of flasks and storage material on filled ground. To overcome this a portable board track was made and no difficulty encountered in running at full speed over this track—a distance of 150 ft.

"While hauls of from 500 to 1000 ft. naturally show larger relative efficiency and saving, economies on very short runs are often effected. A large paint manu-

*Read at the convention of the National Electric Light Assn., Chicago, May 22-26, 1916.

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facturer has replaced four men on a 50-ft. haul and is perfectly satisfied to invest in another industrial truck, having recently given us a repeat order for a branch factory.

"In handling sugar, coffee, cotton, sisal, hemp and other commodities of this character a large dock and warehouse company which formerly used horses for transporting from point to point is now using tractors. The horse is capable of handling a 2-ton load on a single trailer; the tractor handles 8 to 10 tons on three trailers and in one-third of the time. The cost of handling this merchandise was reduced from 22 cents to 8 cents per ton. for bulky and unwieldy freight two or three of the dock and warehouse companies are using a battery truck crane which will load the trailers, tow them to the unloading point and unload them, two men handling the freight, which previously required the services of twelve to fourteen men, and doing it with a greater material saving.

"In Galveston, New Orleans and several New England textile cities the advantages of the electric stevedore in handling cotton have been convincingly demonstrated. In Galveston a single General Vehicle truck with 10-ft. platform has moved 25,000 lb. of flat cotton per hour over a 600-ft. haul on shell roadway. It did the work of eight men, who receive 25 cents per hour per man. In another instance a similar truck hauled fifty bales of cotton in 1 hr. and 15 min., the haul being over 500 ft. In this last case the cost of handling by dragging would have been the cost of eight men for 1/3 hr. at 25 cents per hour, or $2.65, and the cost of operating the truck is about 50 cents per hour. The net saving equals $2.15. In other words, the saving approximates $15 per day.

In Textile Mills

"In handling cotton and finished material about textile mills these little trucks have revolutionized the ideas of mill superintendents. In fact, we often have to be very conservative in stating what the truck will do, otherwise we would prejudice our case and scare the prospective buyer away. It is hard for many prospective purchasers to believe you are telling the truth, even when you cite what is being done every day, so revolutionary in its effect is actual performance.

"It is seldom that any labor-saving device has been provided which enjoys either indorsement or the universal recognition by so many interested units in merchandise handling as the electric stevedore. The railroads, steamship companies, and shipper and consignee alike unite in their unqualified appreciation of the advantages of its adoption. With freight sheds and piers bursting with freight and the question of expeditiously relieving consignments imperative, the utility of the motor truck in relieving this congestion is appreciated by all of the large freight handlers. This is evidenced by the renewed activity on the part of railroad and steamship companies considering the adoption of motor truck delivery in bulk direct to the consignee's sidewalk, the idea being to eliminate as far as possible a large number of wagon units on small consignments. To facilitate this, the adoption of the electric stevedore for collecting and serving these delivery units is a logical development. It is further evidenced by recent demand on the part of a team owners' association* to the Interstate Commerce Commission for tailboard deliveries.

"Our company has made rather extensive sales abroad, notwithstanding unfavorable conditions there at the present time, and I believe other manufacturers have also made sales. Several of the British railroads use them, and in Canada, Australia and South Africa they are being applied to various lines of business. Their ease of handling in crowded places, and the fact that an unskilled laborer can be used in driving them, makes a strong appeal to business men everywhere.

"I have not mentioned one-half the specific services for which the trucks of our manufacture are being put; and, of course, other manufacturers are making initial sales in new fields almost daily. For example, ours are used in three hospitals for moving supplies, including food and miscellaneous equipment. They move coal from pocket to boiler room; for work in three shipyards; on a great number of docks here and abroad; and the variety of work performed is limited only by the present restrictions of operating conditions.

Effect on Architecture

"Architects are already being asked to take the electric stevedore into consideration in their construction of terminals, warehouses and docks of various kinds, and I believe it is safe to state that eventually wherever there is a dozen handtrucks in use at the present time the successful application of some form of the industrial truck will do away with most of them. The railroads used to contend that no time was saved in carting from the billing scale to the car, for every third piece of freight was for a different car which the hand truck could handle better, but they are finding that by systematizing things and making certain changes in their routing the electric can be utilized, and at a great saving. There is no question whatever about the increased use of these trucks, as they form a very important unit in the relief of what is now shown to be unnecessary congestion at freight terminals and unnecessary expense in time and labor in thousands of plants."

*The National Team & Motor Truck Owners' Association.

Electric Trucks and Buses Make Forward Strides in England

N. E. L. A. Pushes Propaganda

By A. Jackson Marshall†

WITH the growing appreciation for the qualifications of the electric truck, we find a number of large and important organizations employing the electric in large quantities. Harrods, Ltd., a large department store in London, is now operating a fleet of some sixty electrics, many of which have been added during the last 2 years. The Midland Railway Co. has seventy-three electric trucks in use or on order, apart from seven electric industrial trucks for hauling luggage. There is reason to believe that ere long many of the commercial transportation fleets in Europe, as is the case in the United States, will be chiefly composed of electrics, and it is quite likely that much of this equipment will emanate from America. The Electric Vehicle Section, National Electric Light Association, has conducted an energetic publicity campaign throughout Europe during the last three years.

To give some idea of the headway being made by electrics in England, it may be stated that 2 years ago, as a result of several years' effort, there were but 150 electrics in use, whereas to-day this number has been increased to 740, an increase of about 500 vehicles at the rate of 250 per year. These figures may not, in themselves, appear large, but when taken as an indication of the rapidly growing popularity of the electric they are significant.

English Tramway Uses Electric Buses

The York Corporation Tramway Department, England, has now had a full 12 months' experience with its four electric omnibuses, and Mr. J. W. Hame, the city electrical engineer and tramways manager, advises that the results have been in every way satisfactory.

Three buses are in daily service, the fourth being kept as spare. The total mileage covered by all vehicles during the year has been 65,470, the kilowatt-hour units used for charging, including all losses, working out 1.23 per mile. The total working expenses per bus-mile, excluding interest and sinking fund, amount to 4½d., about 9 cents.

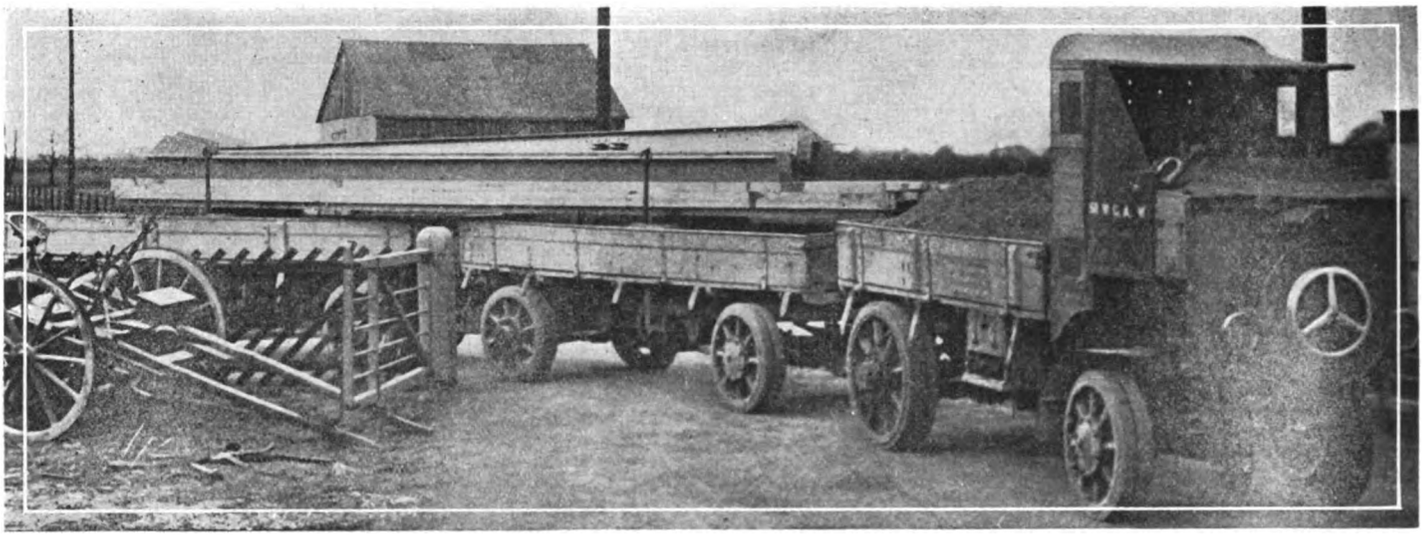
There has been very little expense upon tires so far. Mr. Hame estimates that, allowing for the full tire maintenance cost for a long period, the average working expenses will be of the order of 5¼d., about 11 cents, per bus-mile, excluding standing charges.

At the terminus of the route upon which the buses operate a combined charging station and passenger shelter is provided. The charging cable, with plug attached, is drawn up from the roadway box and attached to the bus.

The driver opens the small door under the observation window of the booster house presses the button upon which the machine starts up and switches itself on to the charging bus bar. A second pressing of the button shuts down the plant.

†Executive Secretary, Electric Vehicle Section, National Electric Light Assn.

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New Armstrong-Whitworth road train, driven through Thomas electro-mechanical transmission. Each trailer is a four-wheel-driven-and-steered electric truck

Our London Letter

By R. Douglas-Vickers

IMPORT EMBARGO ON U. S. TRUCKS FUTILE—RATION PLAN FOR FUEL SAVING—TRUCKS GET GAS CHEAPER—FARM TRACTORS

LONDON, July 18—We have now had time to see what effect the order restricting the imports of commercial vehicles into the United Kingdom is likely to have on the British motor market, at all events for the immediate future. Generally speaking, it has been received with comparative equanimity by all concerned and the reason is probably because it does not materially alter the situation. Most of those who have been purchasing motor trucks for some time past have been firms engaged in work of national importance, that is to say, they have either been engaged in the production of materials of war, foodstuffs and clothing for soldiers, or they have been haulage contractors providing the transport required by the munitions concerns or those occupied directly on other war work. They have hitherto found no difficulty in securing licenses under Class A, which includes all those who are on work such as I have mentioned above.

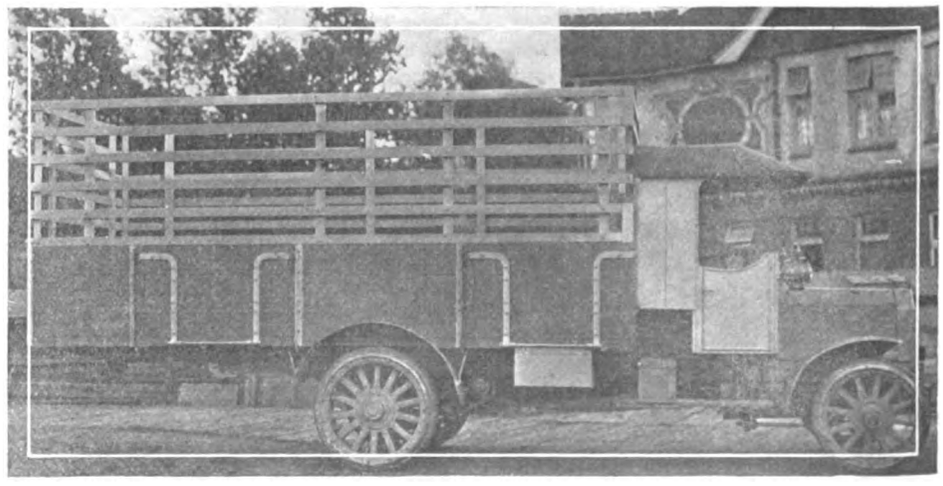
What British Makers Think

Few firms purchasing or using motor trucks are outside this category, except it be department stores and provision merchants who are catering for the needs of the civil community. On the other hand there are a large number of companies engaged upon work for export and the Board of Trade regards this as of prime importance. Cotton manufacture is an excellent case in point and it is this industry that has been absorbing at least 60 per cent of the commercial vehicle chassis which have been imported during the past 12 months. Some of the most successful dealers are located in the Lancashire and Yorkshire districts, and most, if not all, of these have had to rely very largely for their supplies upon the American importing houses. The needs of many exporting concerns have not yet been met, but I do not apprehend any difficulty in this respect.

Those British manufacturers with whom I have discussed the matter do not appear to take the restriction order very seriously. What they like about it is the promise, which they consider it gives them, of something much more drastic in the near future. If it is impossible to secure total prohibition of truck imports, then the alternative that they are working for is an import duty of at least 33 1/3 per cent, as now rules for passenger car chassis. Whether or not they are likely to secure this it would be idle to attempt to prophesy, but it is undoubtedly true that they have secured a great deal of sympathy in Parliamentary circles.

What the Users Think

There are probably only a very few users who would be disposed to welcome the prohibition of truck imports, and more particularly those who have had their own needs satisfied. So far as they have been able to give joint expression to their views it has been in favor of



Peerless 4-tonner engaged in hauling produce and fruit from the Kentish gardens to Covent Garden, London. The truck carries 320 fruit baskets

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the free importation of spare parts of the vehicles they have already got in service. No serious opposition could possibly be put up against this, for it would in no way help the country to have an embargo put upon parts. So far as can be ascertained the majority of commercial vehicle users took up the attitude that they didn't care what the government did so long as they got trucks. If it was going to be made impossible for them to import foreign-built trucks, then British factories must be allowed to supply their needs, an alternative which neither the War Department nor the Ministry of Munitions seem inclined to concede. Indeed, it is almost impossible to see how they could accede to this request so long as large numbers of vehicles are required for army transport or shells are wanted for the artillery.

What American Importers Think

The views of several of the principal importers of American chassis appear to be conflicting, although I am inclined to think that the balance of opinion is in favor of the continuance of a reasonable trade, provided, of course, no further steps are taken by the government and that a liberal interpretation of the regulations is accorded to users. The principal point is that licenses to import will not affect present stocks or trucks on the way to this country or paid for at the time the restriction order was issued. Chassis coming under the latter classification, that is, those in stock or on the way, will be supplied to purchasers who are unable to get a permit in the usual manner, and as the available stocks or prospective stocks are very considerable, this should enable most of the importers to carry on for a very considerable time, certainly to the end of the present year.

Gaston, Williams & Wigmore

This concern appears to think that there will undoubtedly be some diminution of business in American commercial vehicles in consequence of the restriction on imports, but at the same time it is not likely to be seriously affected by it for some time to come, as it has an ample stock of reserves both of complete chassis and of spare parts. Its profits for last year amounted to $3,750,000. Of course they had large army contracts, but these did not preponderate over civil orders to any very great extent. They told me a few days ago that during the past year they distributed well over 600 Selden chassis alone, and it is common knowledge that other well-known American-built chassis have also figured very largely on their order books. At the present time they are calling particular attention to the Vim chassis for light delivery purposes, and at the other end of the scale they are putting forward the claims of the Peerless, Packard and Pierce-Arrow machines, but I do not think that the number of these available here is great at the moment.

Particular attention is being given to the internal-gear-driven Selden trucks, of which quite a number have been supplied to commercial undertakings.

Federals and Denby Trucks

I have just heard from Messrs. Whiting, Ltd., importers of the Federal and the Denby chassis, that they have sold something like 600 vehicles to users in this country, half of whom have been and continue to be engaged on government service. Naturally, if these people wish to place repeat orders there will be no difficulty in importing fresh chassis to meet their requirements. Indeed, with a firm of Messrs. Whiting's standing and connection, the Restriction of Imports order is not likely to put any serious difficulty in their way. They have sold upward of 200 Denby trucks. A firm well known to me, Messrs. Downer & Co., of Southampton, state that a 30-cwt. Denby which they have had for six months has covered over 6000 miles and is giving every satisfaction. To use their own words, "It has given no trouble and is running as sweetly to-day as when delivered. It is most reliable, economical and efficient."

Anzac-G. M. C.

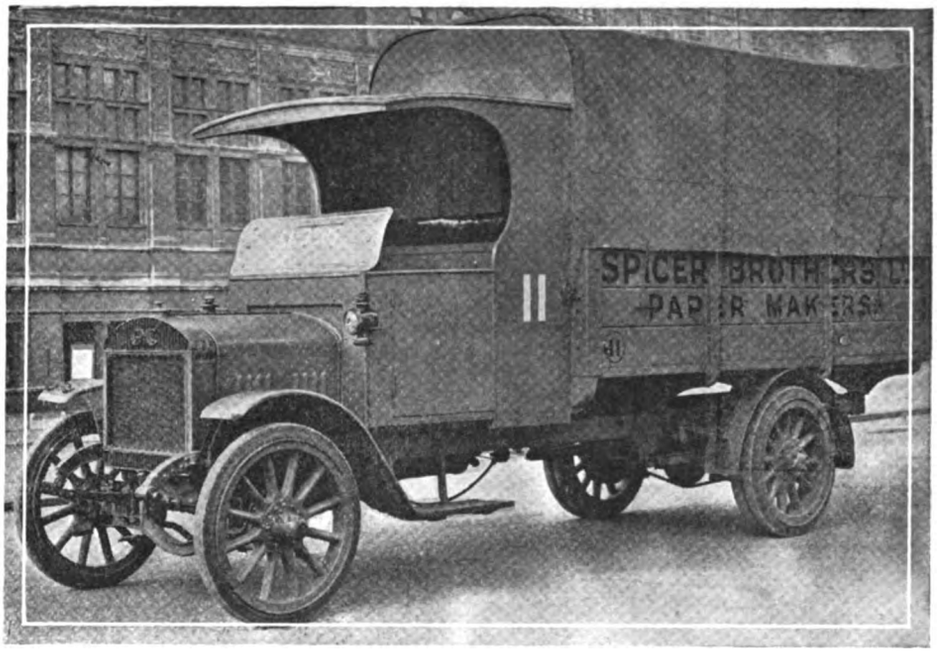
Wherever one goes nowadays one is continually meeting G. M. C. trucks, which are handled in the United Kingdom by the Arzac Motor Co., Ltd., 78 to 82 Brompton Road, London. The company tells me that it has sold upward of 1000 commercial vehicle chassis of the G. M. C. make since August of last year, quite a remarkable performance. It recently received delivery of 200 model 15 1-ton chassis which have gone principally to industrial concerns in the north of England. At least 400 of the model 15 have been supplied for ambulances, and friends of mine in the Royal Army Medical Corps tell me that they are giving the utmost satisfaction. Particular notice was drawn to a number of these chassis through their inspection by Her Majesty Queen Alexandria, a few weeks ago, before being dispatched to the fighting line. I am able to add that this company has also quite a large stock of all G. M. C. models.

I have mentioned these three firms with whom I have recently discussed the import trade, but there are other large importers, such as H. G. Burford & Co., Henry Gainer, the Bessemer Motor Co., and a number of smaller concerns. From what I have been told I should say that about 2000 trucks of the last three makes have been delivered during the past year. This is the aggregate total, of course. They are also said to have ample stocks, a fact which does not surprise me, as they have, no doubt, seen the present situation developing for some time.

Careful investigation appears to bear out the opinion that there are upward of 4000 or 5000 American trucks at work in the United Kingdom and that the recent rate of importations has been about ninety per month.

Gasoline Tickets in England

It has been decided to put all motor owners on a system of rationing so far as gasoline is concerned, the amount they are likely to get to be based upon the purposes to which it is going to be put. A census was taken by which motor owners were required to give their estimated consumption, and it is understood that the information gained through the census has considerably simplified the problem of supplies. Each user is to get a permit to purchase through the usual channels, the permit showing the amount of gasoline to which he is entitled for a given period, the amount of each purchase to be noted on the permit by the dealer.



G. M. C. used by Spicer Bros., one of London's biggest paper makers. They also use Pierce-Arrows and Packards

A further duty was put on motor spirit by the Chancellor of the Exchequer to the amount of 12 cents a gallon, but fortunately a concession was made in favor of users of commercial vehicles—the rate of duty in their case to remain at 6 cents per gallon as against 24 cents per gallon on gasoline used by private pleasure cars. Unless the government should intervene, prices will no doubt get well beyond 72 cents per gallon for No. 1 spirit in 2-gal. tins.

Tractors from U. S.

Much interest continues to be taken in the farm tractor problem, and I am informed that a number of Allis-Chalmers machines are due to arrive about the beginning of August. The name of the maker is well known in this country as belonging to a firm of high repute in the engineering world. Something good is expected in the shape of their farm tractors, about which nothing has hitherto been heard in this country.

R. DOUGLAS-VICKERS.

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Bodies Designed to Conserve Trucks' Time

Load Accessibility and Versatility Features



Fig. 1.—A clothing store on wheels, which consists of a side- and end-door body with interior drawers of various sizes, each for a particular class of goods, such as suits, shoes, hats, etc.

Novel Clothing Store on Wheels

Equipped with a body having side and rear doors and various different-sized interior drawers, the truck shown in Fig. 1 is owned by a Bangor, Me., clothier, who has increased his business in the surrounding rural community by taking his goods to his customers instead of requiring them to come to him. He has been able to do this primarily by the use of a motor truck, which has made it possible for him to cover a large amount of territory in much less time than it could be reached with the available transportation facilities and to secure business in areas which he could not enter formerly because of a lack of transportation means, and, secondly, by fitting a novel type of body on the truck to enable him to carry his good, such as clothing, shoes, hats, etc., without damage *en route* and in such a manner that each particular class of goods could be withdrawn easily and conveniently without the necessity of disturbing the remainder.

The body is of the usual panel type except that it has a side door at the right in addition to the conventional door at the rear. Both of these doors differ from the regular construction in that they are hinged at the top and bottom instead of the sides, the lower halves swinging down as shown in Fig. 1, to form platforms on which the owner may stand to gain access to the interior drawers. There are twenty-two of these, nine of which are reached from the side door and the remaining thirteen from the rear. Each drawer is of a different size to best accommodate the goods it is to carry and each is mounted on rollers so that it can be moved in and out with ease. The truck is a 1½-ton Chase, owned by F. P. Ray, Bangor, Me.

Twin Side-dump Bodies Used on Knox Trailer

Particularly adapted for the use of contractors in the haulage of sand, crushed rock, gravel, etc., the semi-trailer mounting two of the Lee side-dump, round-bottomed steel bodies, shown in Fig. 2, is now being manufactured by the Lee Loader Co., Chicago, for work in connection with the Knox four-wheeled tractor. Each body is an independent unit and one can be dumped on the left side and the other on the right if desired. It is also possible to carry one kind of material in one body and an entirely different kind in the other.

Each body has a capacity of 4 cu. yd., or from 4 to 8 tons, depending upon the material. The trailer is of steel, with heavy steel-tired wood wheels. Its forward end is joined to the tractor by means of the usual Knox fifth-wheel. The feature of the outfit is, of course, the round-bottom bodies, which are dumped



Fig. 2.—A large-capacity contractor's body, made up of two Lee side-dump bodies mounted on a two-wheeled semi-trailer designed for use in connection with the Knox four-wheeled tractor. Each body has a capacity of 4 cubic feet.

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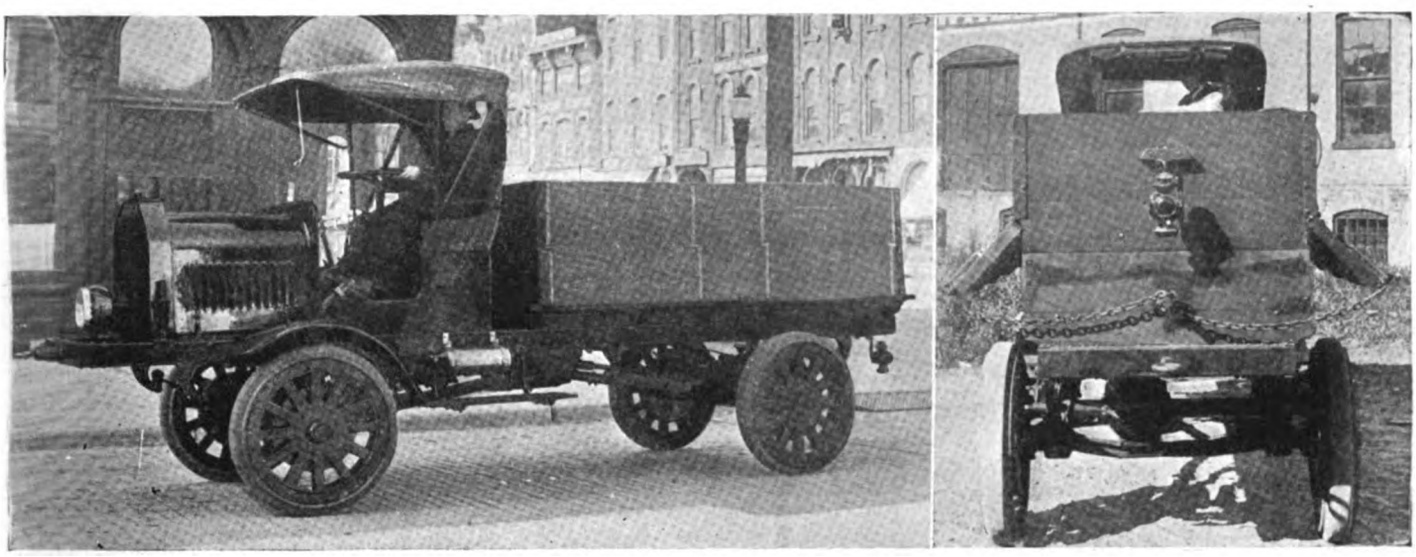


Fig. 3.—Opened and closed from the driver's seat, the contractor's side-dump body shown above is offered as stock equipment on the 2- and 3-ton Duplex four-wheel-driven trucks. The view at the right shows the center shaft around which the end chains which close the sides are wound by means of a ratchet device directly aft the driver's seat

by hand in much the same manner as a baby's cradle is rocked, without the necessity of hoists or other gear mechanism.

As described in THE COMMERCIAL VEHICLE of Feb. 1, 1916, each body consists of a round-bottomed steel box with flareboards which rests on three steel rails placed transversely of the trailer frame. The rails slope down from the centerline of the trailer on each side and terminate in hooks to catch the edge of the body as it is rolled over. Chains attached to the body bottom regulate the angle of dump. The body is locked in its center position by means of an A-frame at each end and hinged struts at the center of each side.

Fifteen-in-one Truck Body

Built especially for the 2-, 3½- and 5-ton trucks of the Sterling Motor Truck Co., Milwaukee, Wis., by the American Wagon Co., Dixon, Ill., the novel body shown in Fig. 4 is characterized by its collapsible sides tied together in much the same fashion as lazy-tongs. These may be folded together or extended so as to form fifteen different shapes of bodies, three of which are depicted in Fig. 4. This type of body, known as the Melrose, is a standard product of the American company and is built to order for the Sterling company to enable the latter to offer it complete with its trucks. It is especially adapted for trucks working about farms, where the various goods which must be carried throughout the year naturally require a different type of body for their most efficient handling.

As described in THE COMMERCIAL VEHICLE of Jan. 1, 1916, the body can be transformed into various shapes to carry the following goods: Hay, livestock, grain, coal, fertilizer, milk in cans, vegetables, barrels, boxes and passengers, etc., etc.

Duplex Side-dump Body

Differing from the usual contractors' side-dump body in that it is opened and closed from the driver's seat by a hand ratchet gear instead of from the ground at the rear, the body shown in Fig. 3 is made by the Duplex-Power Car Co., Charlotte, Mich., and especially adapted to the 2- and 3-ton Duplex trucks manufactured by that company. The body is of wood with a bottom in the shape of an inverted V. Side gates extending the clear length of the body on each side are each hinged to the upper stationary part of the body side at four points. The gates are opened by the pressure of the material carried and closed by means of chains at each end, which are wrapped around the ends of a shaft beneath the inverted V bottom. The shaft is revolved by means of a chain and sprockets directly aft the driver's cab.

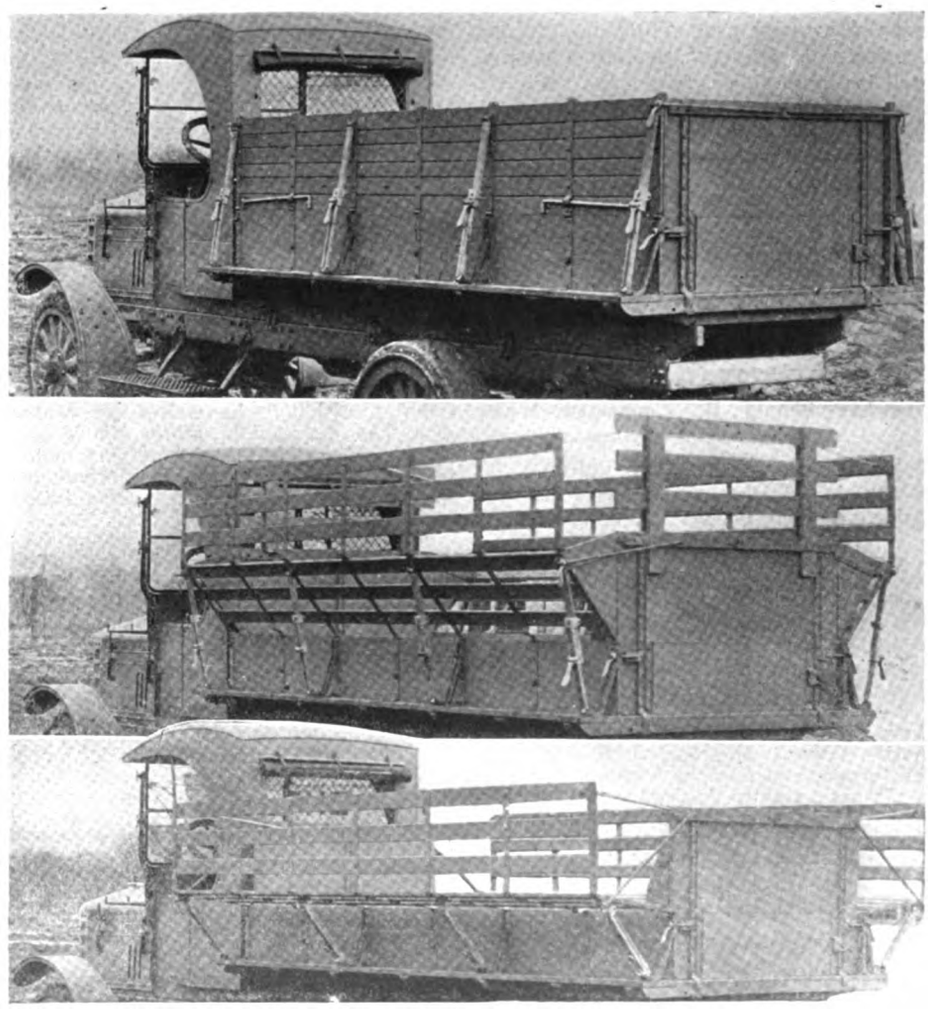


Fig. 4.—The fifteen-in-one Melrose convertible farm body, made by the American Wagon Co., Dixon, Ill., and now offered with Sterling 2-, 3½- and 5-ton trucks. The top view shows the normal body position. The center picture shows how the slat sides may be extended to carry bulky products, and at the bottom is shown the right-angled flareboard type, to carry boxes, etc.

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Devoted to topics pertinent to commercial vehicle operation design and maintenance. Open to the use of all readers. Communications must be accompanied by the sender's name and address, confidential if preferred. No charge is ever made for this service.

COST OF TRUCK FINAL DRIVES

Chain Drive Cheapest—Worm Drive the Most Expensive at Present

To the Editor, COMMERCIAL VEHICLE:

Will you please tell me in what proportion stands the price of worm drive to internal-gear drive; to bevel-gear drive; to chain drive?—JOSEPH JANDASEK, Plano, Ill.

A comparison as above is not possible, because definite percentages are asked for when no definite data is given as to the sizes of the gears, the manner in which the drive is to be applied, the type of vehicle or the power to be transmitted.

In motor trucks of the capacities which use worm drive, worm drive is the most expensive form of those mentioned, internal-gear drive next and chain drive is the cheapest. Straight bevel drive is only used in light vehicles where the ratio of gear-reduction is low. In these cases worm and internal-gear drive are not so frequently found, so that the comparison here does not seem to be very fair. Of course, in a light vehicle of this sort bevel drive is cheaper than worm, internal gear or double chain. Single chain drive would probably be cheaper than the others.

ATTACHING TRAILER TO FORD

Drawbar Should Be Connected With Frame—Not Axle

To the Editor, COMMERCIAL VEHICLE:

Will you kindly furnish me with the following information:

1—Where is the best place to fasten a four-wheel trailer to a Ford—on the axle, or at the point where the spring is attached to the body?

2—If fastened to the axle at two points, as in the case of a pronged V drawbar, at which distance from the differential should the respective prongs be fastened?

3—I have gained the impression that there are two methods of delivering the motive power to the rear wheel—through the torque, and another way—and it depends upon this to determine whether to attach the trailer to the axle or body. Could you enlighten me on this point?—CHARLES BEHLM, Richmond, Va.

1—A trailer of any sort should never be attached to the axle of the drawing vehicle. The rear cross-member of the Ford frame will be satisfactory provided the trailer is not too heavy; but in any event, a trailer should not be used behind a Ford for any but light loads.

2—The drawbar, as stated above, should not be attached to the axle but to the frame. A V connection is not necessary if the drawbar is made strong enough.

3—Torque simply means the twisting moment of anything which revolves. All shaft-driven vehicles are propelled by the torque of the driveshaft. Another way is to drive by chains or belts, in which case the wheels are revolved by the pull of the chains or belts. The method of final drive has nothing to do with the method of attaching trailers.

WHO IS W. F. BRADLEY?

Readers of THE COMMERCIAL VEHICLE without doubt have often had occasion to wonder as to the identity of W. F. Bradley, whose articles on European motor trucks and lately on truck use in the great war have been of such interest and value.

William F. Bradley is an Englishman by birth, but for 10 years he has resided in Paris. For more than 4 years he has been the correspondent for THE COMMERCIAL VEHICLE. This is the only American truck paper to which he contributes, although he writes for *Motor Age*, *The Automobile*, *Motor World* and *Motor Print*. No other American motor journals have access to his services, although he has contributed some interesting articles to the New York *Sun*.

During the war he has had exceptional opportunities for observation, due to his wide acquaintance in motor and official circles in France, England and Italy. He served for a short while with the British motor corps in the early stages of the war and has just left for 6 months similar service on the Austro-Italian frontier.

Although by birth and residence pro-Ally, Mr. Bradley has managed to preserve a coolly neutral atmosphere in his writings for THE COMMERCIAL VEHICLE which have rendered them especially candid and valuable.—EDITOR.

SEVEN MORE TRUCK EXPORTERS

In the list of fifty-four exporters of motor trucks published on this page of the last issue, seven names were accidentally omitted. They are appended hereto.—EDITOR.

Blair Motor Truck Co., Newark, Ohio.
Cadillac Auto Truck Co., Cadillac, Mich.
Commerce Motor Car Co., Detroit, Mich.
Continental Motor Truck Co., Chicago.
Duplex Power Car Co., Charlotte, Mich.
Indiana Truck Co., Marion, Ind.
Kissel Motor Car Co., Hartford, Wis.

WEIGHT AND SIZE OF BIG TRUCKS

Maximum Dimensions and Probable Weights to Be Met By Scales

To the Editor, COMMERCIAL VEHICLE:

The general increase in size and capacity of motor vehicles demands that larger and greater capacity scales must be installed to meet these conditions, and, being interested in the latter, I am endeavoring to gather such data as may allow a suitable design along intelligent lines.

With this in mind, I have been referred to you and your issue of Jan. 15, which, I understand, gives specifications for motor truck wheelbases, gages and load capacities. I would also like to know the weight of the truck, light, and the approximate weight on rear axles.—GEORGE SCHEETZ, Philadelphia & Reading Railway Co., Chief Scale Inspector, Locomotive Shop, Reading, Pa.

There has not been a general increase in the size and weight of motor trucks, rather the reverse; but there has been an increase in the use of trucks, so that scales are more often confronted with heavy trucks. A few years ago much heavier trucks than are now on the market were sold, notably the 10-ton Hewitt and the 20-ton Great Western. To-day the 7-tonner is about the limit.

However, greater loads than 7 tons are carried by means of trailers and semi-trailers, such loads being usually from 10 to 15 tons and sometimes as high as 50 tons. In this latter case, however, the load is distributed between three or more axles. When trailers are used it is not necessary to weigh the complete train, but the tractor and the trailers can be weighed separately.

In regard to dimensions, the January specifications only give the wheelbase and tire sizes. Gauges run from a minimum of 36 in. on light parcel-cars up to 96 in. on the heaviest low-bed trucks. The longest wheelbases likely to be encountered are not more than 216 in. In overall length motor trucks seldom exceed 380 in.

Load distribution varies, the maximum being about 80 per cent of the total weight on the rear axle. It is impossible to quote accurate figures on the weights of trucks owing to the fact that THE COMMERCIAL VEHICLE does not collect this data. The heaviest trucks usually weigh less than their loads, even with heavy types of bodies, so that if 15,000 lb. is taken as the greatest empty weight that is likely to be encountered on four wheels it will be about right.

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Rainier ½-Tonner at $850 Has Truck Design

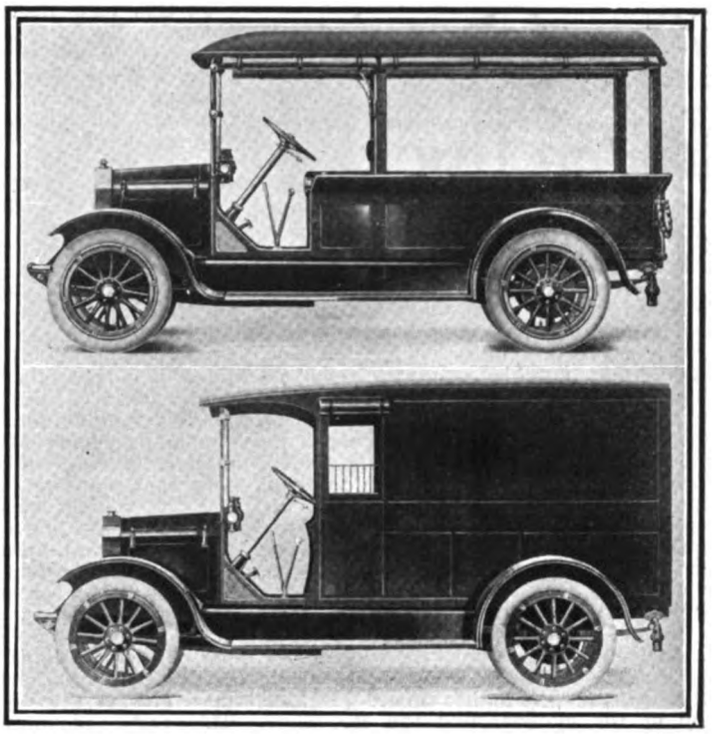
Novel Spring and Bracket Used in Hotchkiss Drive

BUILT in a single ½-ton size upon the ideal that a 1000-lb. commercial vehicle, no less than one of 10,000 lb. capacity, should be designed for commercial service, the Rainier light delivery truck has been produced by the Rainier Motor Corp., New York City.

Specialization is to be the policy of this concern, one chassis model only being produced but in a number of distinctive body styles. The vehicle is not intended to compete with low-priced 1000-pounders, but is intended for the buyer who looks for real truck construction and is willing to pay for it. In fact, the new Rainier will in all likelihood compete with 1500-pounders of recognized makes, since many of these are used by firms which only require 1000 lb. capacity but who buy the heavier chassis because of their high-grade construction.

In the make-up of the truck nothing radical is to be found, but there are several important details that show original thought on the part of the designer. A painstaking effort has been made to make the appearance of the chassis good, and the result is proportions that suggest staunchness and stability. Details of finish have been given attention to carry out the quality ideal.

To effect these ends the frame has been carried very low and extended back the full length of the body. The cab floor hugs the frame closely and, with the footboard and dash, is a single steel stamping. The hood is high and blocky, with a polished radiator of Rolls-Royce



Open express type of body applied to Rainier 1000-lb. chassis, fitted with a light, flexible top.

Tiffany type of panel body, showing how low lines and high hood give rakish appearance

form set well back over the axle. The sides and top of the hood are separate, as is found in larger trucks, with snap fasteners at the eaves. Fenders are wide, modishly rounded over the wheels and lavishly winged to the frame. The running-boards are extended the full length and are of wood covered with aluminum. A competent bumper is applied to the front spring-horns and the side lamps are set in a substantial ventilating windshield.

SPECIFICATIONS

Capacity	1000 lb.
Price	$850
Wheelbase	115 in.
Tires—Front	33 x 4
Rear	33 x 4
Bore	3¼
Stroke	4¼
N. A. C. C. hp.	16.92
Speed—R.p.m.	2800
M.p.h.	52
Gear-ratio in high gear	5.8-1
Final drive	Worm

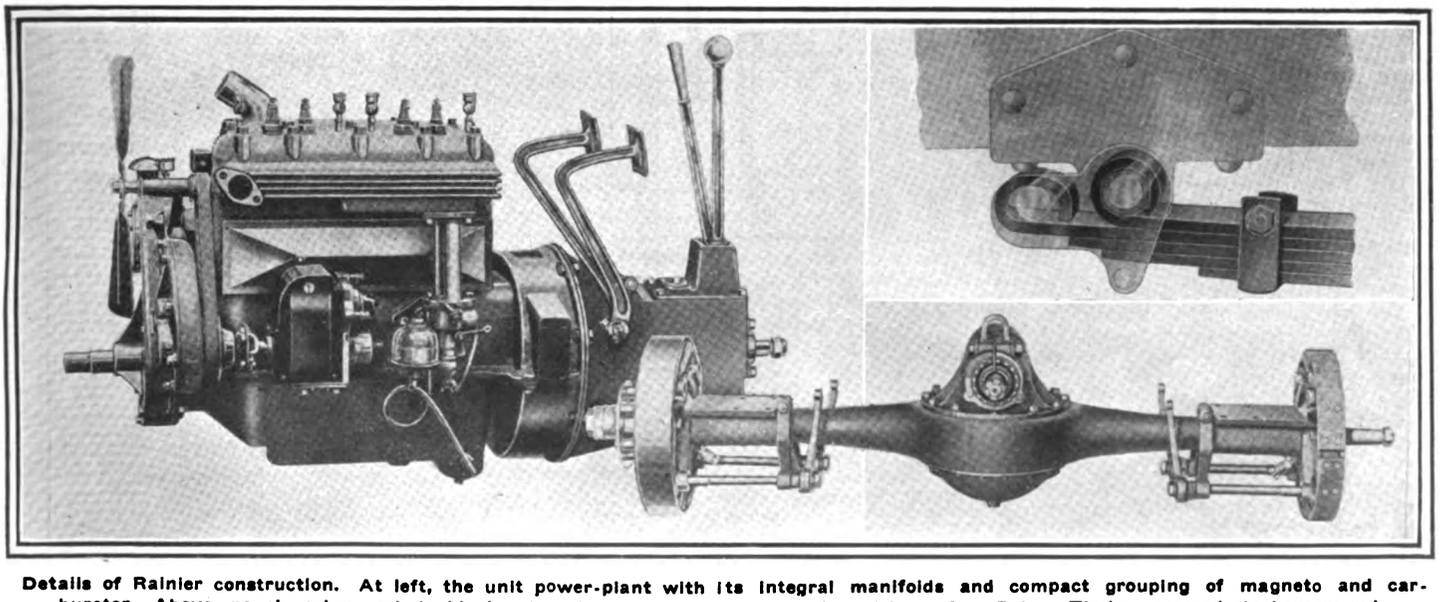
The truck is mounted on pneumatic tires on demountable rims, their size being unusual for this capacity of chassis.

The engine, which is of special Rainier design, is a four-cylinder, block, unit power-plant type, built for high speed. It is mounted on two crankshaft bearings and in the cylinder block are included both manifolds. The cylinder heads are cast in a separate piece.

Valves are to the left, a single pressed-steel cover inclosing the eight springs and tappets. Thermo-syphon circulation is assisted by the high hood and radiator, giving a good head of water. The radiator has a flat vertical-tube core and a sheet-metal casing.

A Carter 1⅛-in. carbureter bolts to the inlet pipe on the left side, just below the valve-spring cover. In front of it is the Dixie magneto, driven from a third gear in the timing gearcase through a leather coupling. The fan-belt pulley is driven from the same connection, the fan being

(Continued on page 33.)



Details of Rainier construction. At left, the unit power-plant with its integral manifolds and compact grouping of magneto and carbureter. Above, novel spring and double bracket designed to make Hotchkiss drive safer. Below, Timken pressed-steel worm axle

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Accessories for the Truck

P. D. Q. SPARK PLUG

P. D. Q. spark plugs, manufactured by the Wolverine Spark Plug Co., Detroit, differ from other spark plugs in that the insulating core and shell are two distinctly separate units so constructed that the former may be instantly removed from the latter without the aid of a tool or wrench. As shown in Fig. ?, this is accomplished by a wire bail attached to the insulator. The top of the shell, formed into the shape of an hexagonal nut on the outside to enable the shell to be screwed into the cylinder, has two open slots cut into it on the flat surfaces on opposite ends of one diameter. In placing the core into the shell the bottoms of the bail are slipped into these open slots. The core is then turned about its longitudinal axis until the ends of the bails reach the closed ends of the slots, at which time the bail is turned down on top of the cylinder and the core thus locked in place.

The relative position of the bail on the core to the slots is so arranged that when the bail is in its locked position a ground seat on the core is forced down against a convex-shaped seat on the shell. This joint is claimed to be leakproof without the necessity of a washer. Both electrodes are carried on the insulating core, as shown in Fig. 1. This, together with the fact that the core can be removed quickly, renders it very easy to clean the plug. Priming of the cylinders in cold weather can also be accomplished by simply removing the plug, squirting in the gasoline and then replacing the core.

The cores can be purchased separately, so that when one of these is broken it is not necessary to buy a complete plug, which, of course, costs more than the core alone.

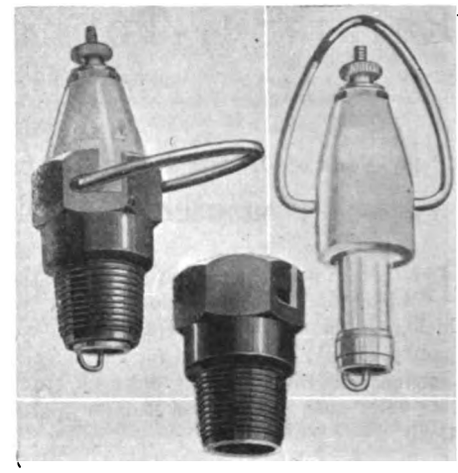


Fig. 1—P.D.Q. plug, showing plug complete and separated. No tools are needed

SAFETY CONTROLLING DEVICE FOR ELECTRIC TRUCKS

Designed to eliminate the waste of electric current of an electric motor truck and the danger of injury to the truck's motor when the controller is left in a position to energize the motor at the same time the brake is applied to the vehicle, a device recently patented by S. S. Amdursky, Rochester, N. Y., makes it impossible to have the controller in its driving position when the brakes are applied. This is accomplished by means of an electromagnetic mechanism, as shown in the two views of Fig. ?. The left view is a front elevation of the controller and its added mechanism, and the right view a side elevation of the same.

The electromagnetic mechanism consists of a solenoid magnet mounted in the base of the controller case. Two vertical racks are attached to the top of the movable core of the magnet. These racks are connected by means of horizontal cross-pieces at top and bottom. A mutilated gear, carried on a horizontal countershaft below the top of the rack framework when it is in its highest position, meshes with the teeth of the racks. A pinion, also mounted on the same shaft as the mutilated gear, meshes with a segmental gear pivoted to the controller shaft as shown in the right view of Fig. 2.

In this view the controller handle is shown in its neutral position. When it is moved in either direction from that position the segmental gear on its shaft revolves the pinion on the countershaft, causing the teeth of the mutilated gear to engage one of the racks and raise the rack framework and the core out of the solenoid. If the solenoid is energized after the parts have been moved in this manner, it tends to pull the core and the rack framework down again, thus rocking the several gears back to their normal position and causing the controller to return to its neutral position.

In order that the energizing current is employed only when the brake is applied, it is controlled through an electric circuit which is opened and closed by the brake manipulation. The solenoid is shown connected with the leads of an electric battery, which may be the battery that supplies the current for driving the vehicle, this battery being indicated in the conventional manner between the two views of Fig. 2. The free ends of the wires of the circuit are attached to two contact pieces, which may contact with the lower end of a bell-crank lever shown near the top left corner of the side elevation. The other end of this bell-crank has a pin which works in a slot in the top of a vertical rod. This rod is connected with the brake rod by another bell-crank. As the brake rod is moved by pressure on the brake pedal, the vertical rod is pushed up, turning the bell-crank and its contact point so that the latter closes the solenoid circuit. This automatically brings the controller back to its neutral position, as previously explained. The releasing of the brake allows the vertical rod to move down and break the circuit, so that the controller can be moved to either the ahead or reverse position.

The extreme top of the vertical rod also serves to prevent the controller from being moved from neutral position while the brake is applied. The top of the rod is bent in the shape of a hook, which engages with one arm of a detent pivoted to the controller casing. The other arm engages a beveled lug mounted on the controller shaft. So long as the brake is not in operative position, the detent is held in position on the beveled lug by means of a small coil spring. When the brake is set, the upward movement of the hook at the end of the vertical rod permits the detent to be released, and when the controller returns to its neutral position the detent rides over the beveled lug and snaps into position behind it, as shown in the side elevation. It is then impossible to move the controller into the forward position until the brake is

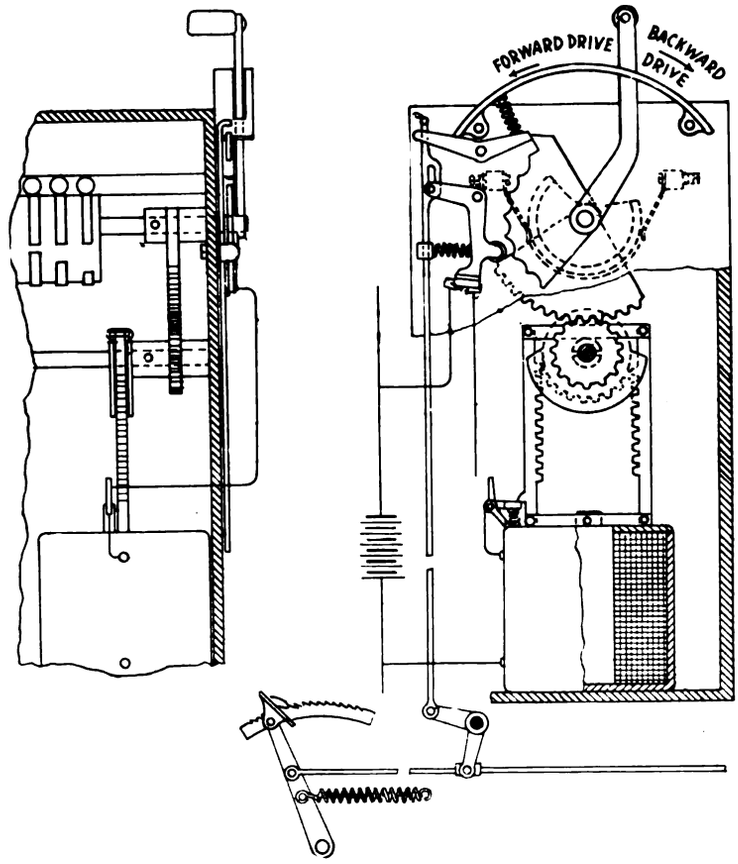


Fig. 2—Amdursky safety controller for electric vehicles. Brake application causes the controller to fly to neutral position

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released. The detent is not arranged to prevent movement of the controller to the reverse position, since it may be desirable to move the controller to such position while the brake is applied in order that the motor may be used to supplement the action of the brake in arresting the movement of the vehicle.

RUGGLES MOTOR GOVERNOR

Simplicity and cheapness are the main characteristics of the motor governors made by the Republic Motor Truck Co., Alma, Mich., and fitted on all the vehicles made by that concern. The device consists of a stepped-cone shaped stud screwed into a threaded port in the intake manifold. This stud is hollow and threaded on the inside to admit of a hollow tube which serves as a seat for the boss of a flat, circular, pan-like damper. The large end of a conical spring placed around the hollow tube is attached to the damper and the other end to a collar on the hollow tube. This collar in turn is fastened to a small straight-sided coil spring, the other end of which is hooked into a hole in the end of a rod inserted in the hollow tube. This rod has a pin on one end, which is constrained to move in a slot in the tube. The other end is threaded and provided with a nut by means of which the rod is turned, the pin working in the slot, causing the rod to move in or out of the tube when turned without revolving in relation to the tube, but compressing or extending the conical spring. The adjusting nut on the end of the rod is provided with a wire ball for easy turning. A brass screw-in cap acts as a cover for the end of the governor. A cross-sectional view of the device is shown in Fig. 4.

In operation, the suction of the motor tends to compress the conical coil spring and bring the circular damper toward its seat, thus shutting off the intake of the fuel into the cylinders, the path of the fuel being indicated by the arrows in Fig. 4. When the speed of the motor has reached its maximum, the damper is tight on its seat, preventing the entrance of any further fuel until the speed again drops below the maximum, when the spring forces the damper off its seat. The device is adjusted by removing the cover and turning up the rod inside of the hollow tube, which in turn regulates the compression of the damper spring.

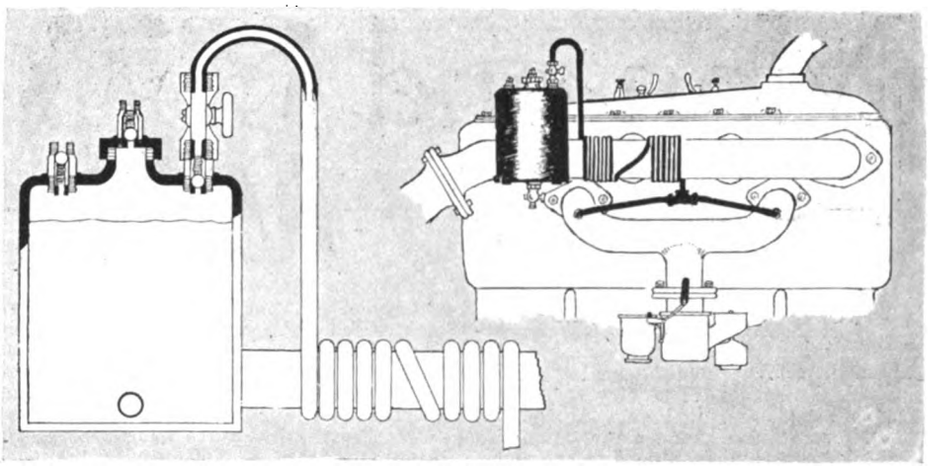


Fig 3—Oxygenerator, as installed on a conventional engine and a cross-section of the water container

OXYGENERATOR FOR TRUCK MOTORS

Designed to introduce a small quantity of water vapor into the fuel fed to the engine of a motor vehicle for the purpose of increasing power and removing carbon, the Oxygenerator consists of a small water container attached to the exhaust manifold and two coils of pipe wrapped around the exhaust manifold and then led in two branches to the intake manifold.

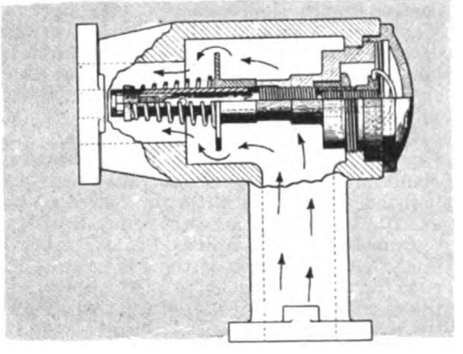


Fig. 4—Cross-section of Ruggles governor applied to manifold

The container, which is made of aluminum, is filled with water, and the heat of the exhaust soon raises the temperature of the water to the boiling point of 212 deg. Fahr. At this temperature the water is turned into steam, which is then drawn off and sucked through the hot coils around the exhaust pipe, the temperature of which varies from 1400 to 1600 deg. The steam is thus turned into superheated steam and then practically decomposed into its two elements of hydrogen and oxygen. These two elements in their gaseous state then pass through the two branches from the coils into the intake manifold, where they mix with the fuel being fed to the motor through the carbureter.

The oxygen passes into the cylinders with the fuel and combines with any carbon deposits, forming carbon dioxide gas, and thus removing the carbon in its solid state. Any excess of free oxygen in the cylinders then enters into combination with the free hydrogen.

Rainier ½-Tonner at $850 Has Truck Design

(*Continued from page* 31)

of the two-bladed type. Single ignition is used, the spark advance being controlled by hand.

Lubrication on the circulating-splash plan is effected by a pump driven off the crankshaft, delivering oil to troughs under the connecting-rod ends. Provision against smoking is made by holes drilled in the piston skirts below the scraper rings.

Although no governor is fitted and the maximum motor speed would represent 52 miles per hour, as shown in the specification table above, the power of the motor has been kept down sufficiently so that a speed greater than 25 miles per hour will seldom be reached, this being ample for commercial service. If it is exceeded the pneumatic tires serve to prevent harmful vibration.

The three-speed Grant-Lees gearbox is driven by a Borg & Beck three-plate dry clutch, final drive being transmitted by a shaft with two universals to the Timken pressed-steel worm-driven axle. This axle is the new 1000-lb. model and follows the semi-floating school of construction.

In adopting Hotchkiss drive the Rainier company has guarded against the excess strain which this method of drive imposes upon the springs by making the rear springs very long and by a unique method of pinning at their front ends. This scheme was developed collaboratively by the Rainier and Perfection Spring Co. engineers, and comprises a double-eye system. The upper leaf of the spring is like the usual type, with a fixed pin and a bronze bushing. The second leaf, however, extends beyond the top one and loosely incloses a secondary pin. The third leaf extends beyond the top one, but not as far as the second. This gives a three-ply support at the spring tips. In the event of the breakage of the top leaf the second leaf and the secondary pin come into play, being otherwise out of action. A further safeguard is afforded by a side plate and retaining pin below the third and fourth leaves.

The frame is unusual in that it is 4½ in. deep at its greatest section, this being a clear inch deeper than in some 1000-lb. trucks.

In the control there are interesting features. The steering column is to the left, the hand wheel being 18 in. in diameter—exceptional for this size of truck. Hand levers are in the center. Both hand and foot control of the throttle are used, the hand lever being of the Renault type, below the wheel. The spark lever is on the dash.

The lamps on the dash are of the oil type, and are mounted behind it, their lenses being flush with the outside. An exceptional feature is the fact that the rear spring shackles are almost at the extreme rear of the frame and body. A body length of 74 in. permits some interesting body designs to be applied to the chassis, as the illustrations herewith bear testimony.

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Men and Makers

REPUBLIC MOTOR TRUCK CO., Alma, Mich., is planning the erection of two new large factory additions in which it will manufacture its new ½-ton truck. The new structures are to be put up just east of the old plant and will extend from Michigan Avenue along Bridge Street to the river. The main building will be 60 by 1,000 feet, one story in height. A one-story stockroom building, 36 by 500 feet, will be built parallel to the larger structure. The two buildings will have a total floor space of 48,000 sq. ft. and will cost approximately $38,000. The Republic company at present employs about 700 men, and it is expected that this force will be tripled when the new buildings are completed and the full production of the new model got under way.

Studebaker Corp., Detroit, has just let contracts for additional construction work at its Detroit factory. An extra floor, 50 by 300 ft., will be added to one of the three-story buildings at present used as a warehouse for materials, so that a larger stock of parts can be carried. A new one-story structure having 25,000 sq. ft. of floor space will be erected for final-assembly work. Authority has also been obtained for the laying of a new railroad siding at the plant. This siding will be flanked by platforms on each side ¼ mile long. It is expected that the cost of the new construction work will be close to $100,000. The land for the new one-story building was purchased last May. It adjoins the present Studebaker plant No. 3, and was formerly occupied by seventeen dwellings. With the annexation of this property the total floor space of the Studebaker factories has been increased to 150 acres.

Acason Motor Truck Co., Detroit, has leased the old plant of the Signal Motor Truck Co., on Commonwealth Avenue and the Grand Trunk Railway. The building will add 13,000 square feet of floor space to the present Acason plant.

Forschler Motor Truck Mfg. Co., New Orleans, La., has been formed by the Philip Forschler Wagon & Mfg. Co., to take over the truck end of the business. The new concern is incorporated at $500,000.

Union Truck Co. Officers were elected at the plant of the new company in Bay City, Mich., on July 26. They are as follows: James R. Tanner, president; H. E. Woodworth, vice-president and general manager; E. C. Tibbetts, secretary, and George Beaulier, treasurer. These officers and H. E. Buck, W. H. Boutell and C. E. Chatfield form the board of directors. The new Union truck will be made in the plant formerly occupied by the Marine Iron Wks., at Water and Second Streets.

The Studebaker Corp.'s Los Angeles, Cal., retail branch has opened a day-and-night selling campaign to take care of the increase in commercial and passenger car sales. The salesroom is now kept open day and night and the sales force is worked in shifts.

Gramm Co., Inc., New York City, has just closed a contract with the Day-Elder Motors Co., Newark, N. J., and will act as eastern distributor for the Day-Elder line of motor trucks in the territory comprising New York City, Long Island and lower New York State as far north as Albany; the State of Connecticut and northern and eastern New Jersey, with the exception of Union and Essex Counties. The Gramm Co. is at present distributor for the Gramm-Bernstein line of heavy-capacity trucks made by the Gramm-Bernstein Co., Lima, Ohio.

J. H. Ryan Motor Truck Co., Madison, Wis., State distributor for the Diamond-T truck, has established a branch service station and salesroom at 495 Broadway. Milwaukee, Wis. The entire State territory will be handled from the new Milwaukee branch. J. H. Ryan has moved from Madison to Milwaukee to take personal charge of the organization.

Four Wheel Drive Co., Clintonville, Wis., is to establish a New England connection with headquarters in Boston, Mass. Sales Manager G. P. Hewitt has been conferring with some Boston men to handle the truck as an agency for that city and the factory will send men there to develop the outside territory.

Carlton - Shephard - Bowles, Inc., Los Angeles, Cal., successor to the Charlton, Faulkner and Bowles Co., has been appointed southern California and Arizona distributor of the Stewart truck line.

Jackson-Church-Wilcox Co., Saginaw, Mich., manufacturer of the Jacox steering gear for motor trucks, will at once begin the erection of a new factory addition at its present plant. The structure will be 120 by 208 ft., made of brick, and one story high. When finished, it is expected that the new addition will enable the output of the company to be doubled. More than 800 men will be employed in the enlarged factory.

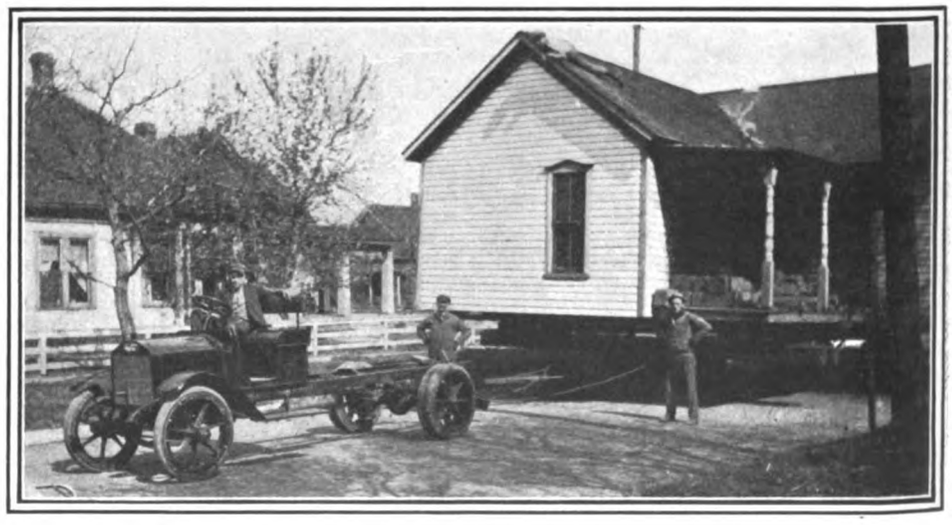
Electric Storage Battery Co., Philadelphia, Pa., has just purchased forty-four private dwellings on Nineteenth Street and Allegheny Avenue in that city. The property on which these houses stand is adjacent to the company's present main office and it is expected that the ground just bought will be used for the erection of additional factory buildings.

Western Spring & Axle Co., Cincinnati, Ohio, is making additions to its plant in that city and also to those in Canton, Ohio, and Flint, Mich. A new building at the Cincinnati factory will be used for the manufacture of motor vehicle axles and for increasing the output of springs. The Flint additions will be used for carrying on the heat-treating processes and for fitting, while those at Canton will be used for storage purposes and for the finishing department.

Celfor Tool Co., Buchanan, Mich., maker of internal-gear-driven rear axles for motor trucks, has almost completed its new one-story building, 137 by 300 ft.

Edward G. Budd Mfg. Co., Philadelphia, Pa., a large maker of bodies for motor trucks, and especially those for bus work, is erecting a large factory addition at its present plant at Twenty-fifth Street and Hunting Park Avenue, to take care of increased body orders.

Robinson Machine Co., Ecorse, Mich., has bought a plot of ground west of Mill Street, where it will erect a factory for the manufacture of its Ford adapter called the Truckford. Fifty men will be



The great draw-bar pull of the motor truck is strikingly shown in the above illustration, which depicts a 2-ton Dart commercial vehicle moving an entire house over a roadway in Kansas without the use of any blocks and tackle. The driver of the chassis, the Dart dealer in Pittsburg, Kan., was on his way to show the vehicle to a prospective buyer when he was stopped by the house, which took up all of the road. He was told by the house mover that it had taken 2 hours to move the house two blocks by means of horses, blocks and tackle, and pulley drums. The driver then offered to give the mover a lift, and greatly surprised the latter by pulling the house twelve blocks, around one corner and up a grade in 15 minutes, simply by hitching directly to the house without the use of any pulleys

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employed as soon as the new building is completed.

Buffalo Pressed Steel Co., Buffalo, N. Y., has leased the mill property of John R. Keim on Kensington Avenue. The building was formerly occupied by the Ford Motor Co. The property is particularly suited to the work of the Buffalo company and will permit of building expansion if desired.

Schweppe & Wilt Mfg. Co., Detroit, has just moved into its new plant at 73 Conant Road. The concern manufactures motor vehicle parts, including steering gears.

Enterprise Foundry Co., Muskegon, Mich., maker of castings for the motor vehicle trade, has completed plans for the erection of a new three-story plant addition to be 50 by 150 ft.

Salisbury Wheel & Mfg. Co., Jamestown, N. Y., has just increased its capital from $500,000 to $1,000,000, in order to provide for factory expansion to take care of an increased amount of business.

Pennsylvania Rubber Co. has moved its New England branch into a new building just finished for it on Beacon Street, Boston, Mass.

Edward A. Cassidy Co., New York City, has just completed arrangements with the F. W. Mann Co., Milford, Mass., to market the Kimball motor vehicle jack throughout the world on a long-term exclusive sales contract.

Howard E. Coffin, consulting engineer for the Hudson Motor Car Co., and member of the United States Naval Consulting Board with especial reference to motor transport in Uncle Sam's army, sails for Europe next week on the liner Philadelphia, of the American Line. He will spend a month in England and France studying the industrial and army transport systems in those countries.

Granville A. Pollock, who has represented the Pierce-Arrow Motor Car Co., Buffalo, N. Y., with the French army now in Flanders, during the past 18 months, has returned to the United States for a brief stay. He had charge of the motor trucks mounted with anti-aircraft guns.

F. X. Devlin has resigned as purchasing agent of the Federal Motor Truck Co., Detroit, to become identified with the Elgin Motor Car Corp., in Chicago. Mr. Devlin had been connected with the Federal company since its formation 6 years ago.

Four Wheel Drive Tractor Co.'s officers were recently elected in Clintonville, Wis., as follows: Charles Todd, president; W. H. Finney, vice-president; A. B. Mayhew, secretary: L. C. Larson, treasurer, and directors, F. M. Hyde, H. Zarling and A. Stewart. The company, a new Wisconsin corporation organized in Antigo, Wis., was recently purchased by Clintonville interests. It will have a factory in Clintonville and will start the production of tractors within 30 days, it is understood.

Paul Moore, advertising manager of the Service Motor Truck Co., Wabash, Ind., has been promoted to the position of assistant sales manager of the same concern. He is succeeded as advertising manager by E. T. Herbig, formerly identified with the publicity department of the Bell Telephone Co.

Paul B. Donaldson, formerly connected with the Philadelphia, Pa., branch of the Chase Motor Truck Co., Syracuse, N. Y. was transferred to the home office of the company on Aug. 1. He will hereafter act as a special field representative for the Chase company.

Victor L. Phillips, Kansas City, Mo., has just completed arrangements with the Four Wheel Drive Auto Co., Clintonville, Wis., to handle the sales of that company's trucks in the Kansas City territory. His offices are located at Seventh and Delaware Streets.



The above illustration depicts an unusual incident—a tug of war between a motor truck and a team of horses in the service of the Wells Fargo express company in Los Angeles, Cal. The truck, a 1½-ton Federal, had no trouble in pulling the wagon and the team of three horses attached to it backwards. Due to the fact that horses were not made to move backwards for any considerable period of time, the pull was naturally a short one. The horse at the extreme right appears to be bracing itself against the pull which it feels coming

Connell & McKone, eastern Massachusetts distributors of the Overland, have opened their new building at 753-755 Main Street, Worcester, Mass.

H. A. Schendel, New England representative for the Redden Motor Truck Co., Detroit, has appointed T. F. Russell agent for Hampden county, Mass., with headquarters at Springfield; William J. Keefe for Hampshire and Franklin counties, with headquarters at Northampton; and J. Rose of Pittsfield the dealer for Berkshire County, all in Massachusetts.

J. W. Maguire, Boston, Mass., who has the Pierce-Arrow line in Boston, has had a set of plans drawn for a large service station on Commonwealth Avenue, next to the Packard plant of Alvan T. Fuller. Mr. Maguire bought the land a year ago, and now he has been in conference with the factory officials regarding the style of structure to be erected. If the plans are approved work will begin late in the fall or early spring. The building will cost about $100,000.

Alvan T. Fuller, Boston, Mass., who has the Packard line of trucks for eastern New England, has built up a big business with his vehicles and has been forced to start building another structure that will be an exact duplicate of his present big structure there. It will cost $250,000 and give him another 150,000 sq. ft. of space, making his plant the largest of its kind operated by a dealer in the United States, it is claimed. The first floor will be used as a salesroom for used cars, and the rest of the building as a service station, the greater part for his truck trade. The building will stand close to the other, being connected by an U-wing, leaving a courtyard 80 ft. wide between the two.

Melbert W. Taylor, formerly manager of the maintenance and construction department of the Packard Motor Car Co., Pittsburgh, Pa., has recently been appointed manager of the Detroit office of the Asbestos Protected Metal Co., located in the Penobscot Building.

H. H. Hay, Baltimore, Md., has just closed a contract with the Day-Elder Motors Co., Newark, N. J., to act as distributor for Day-Elder trucks in the States of Maryland and Delaware and in the District of Columbia. Mr. Hay maintains his offices at 932 Linden Avenue, Baltimore.

Frank Crockett, who has been handling the Knox tractors in Boston, Mass., for some years, has joined the Connell & McKone Co., to take charge of the company's new service station.

Alvan T. Fuller, Packard dealer in eastern New England, has just opened a branch at Haverhill, Mass., primarily to build up a truck trade with the big mills in Haverhill, Lawrence and Lowell, the former city being the logical location for the territory.

Cressy & Burns, Rhode Island distributers for Vim trucks, have announced that purchasers of Vim trucks may now buy them on time payments through the Mercantile Trust Company of Illinois.

John L. Judd, Boston, Mass., dealer for the Smith Form-a-Truck, has taken the entire New England territory for it, and he is now traveling through the section placing sub-agents in the big cities. William A. Harris, special factory representative, is aiding Mr. Judd, and he will remain in the New England territory for some months.

S. W. Hartley, formerly sales manager of the Standard Welding Co., Cleveland, Ohio, has resigned to accept a similar position with the Ladish-Obenberger Co., Cudahy, Wis., manufacturer of drop forgings for the motor vehicle trade.

L. R. Smith, Indianapolis, Ind., representative for Eisemann magnetos for several years, has resigned to accept the position of general sales manager for the motor department of the Buda Co., Harvey, Ill.

L. P. Murray, formerly in charge of the store and garage sales department of the S. F. Bowser Oil & Tank Co., Fort Wayne, Ind., was on August 1 promoted to midwest sales manager for the concern and will have charge of the offices of the company in Chicago, Denver, Col.; St. Louis, Mo., and Dallas, Tex.

J. G. Rodman, formerly executive assistant of the S. F. Bowser Oil & Tank Co., Fort Wayne, Ind., has been promoted to central-district manager of the same company. He will have charge of the offices of the concern in the states of Ohio, Indiana and Michigan and those in Louisville, Ky.; Memphis, Tenn., and Atlanta, Ga.

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E. J. Little, formerly manager of the New York City office of the S. F. Bowser Oil & Tank Co., Fort Wayne, Ind., has been promoted to eastern manager for the same concern and will have charge of the company's offices in New York State, Harrisburg, Pa., and Washington, D. C.

E. H. Briggs, formerly factory sales manager of the S. F. Bowser Oil & Tank Co., Fort Wayne, Ind., has been promoted to the executive assistant in the Bowser organization, in which position he will have charge of the company's sales promotion work.

Otis C. Friend, formerly with the Mitchell-Lewis Motor Co., Racine, Wis., has been appointed assistant to Alfred P. Sloan, Jr., president of the United Motors Corp., New York City. As reported in the May 15, 1916, issue of THE COMMERCIAL VEHICLE, the United Motors Corp. is a merger of the Engineering Laboratories Co., Dayton, Ohio; Hyatt Roller Bearing Co., Newark, N. J.; New Departure Mfg. Co., Bristol, Conn.; Perlman Rim Co., Jackson, Mich., and the Remy Electric Co., Anderson, Ind.

J. D. Arnold has been appointed general auditor of the United Motors Corp., New York City. He was formerly secretary and auditor of the Nernst Lamp Co., Pittsburgh, Pa.

T. F. Flanigan, assistant sales manager of the Pyrene Mfg. Co., New York City, has been promoted to the position of sales manager for the same concern. He has really acted in his new capacity since the election of C. L. Allen to the presidency of the company.

The Annual Firestone Picnic was held at Silver Lake Park, near Akron, Ohio, on Saturday, July 29. Employees of the Firestone Tire & Rubber Co., and their families to a total number of 25,000, were transported to the park in special trains. The day was spent in entertainment on the various amusement devices at the park in addition to athletic sports consisting of baseball and soccer games, prize waltzes, swimming races, bowling contests and a tug-of-war. Music for the day was furnished by the Firestone band, composed entirely of Firestone employes.

The Studebaker Moonlight Sail, the fourth annual event of its kind, was held under the auspices of the Manufacturing Club of the Studebaker Corp., Detroit, on Aug. 3. The steamer City of Toledo was chartered to accommodate the large number of Studebaker employes who attended. Both the Studebaker band of forty pieces and the Studebaker string orchestra were pressed into service. The band gave a concert in the salon and the orchestra supplied the dance music. The proceeds from the sail were given to the Studebaker charity fund which is maintained to assist families of needy Studebaker employes and former employes. In accordance with its regular policy, the Studebaker Corp. donated to the fund an amount equal to the proceeds from the sail.

The Baseball Team of the Fafnir Bearing Co., New Britain, Conn., has won the championship of the New Britain factory baseball league. The team is composed entirely of men working at the Fafnir factory, none of whom were hired for their baseball prowess. The team won six out of seven games, being defeated only by the Stanley Wks. team. The latter team was afterward defeated by the Fafnir aggregation in a return match.

The Course of the Little Cuyahoga River, which flows through the plant of the Goodyear Tire & Rubber Co., Akron, Ohio, has been diverted so that the Goodyear concern has reclaimed several acres of land upon which it will erect its new mechanical goods plant.

Motor Trucks at the Brockton, Mass., Fair will hereafter be properly housed, the managers of the big event in Brockton having begun the erection of a large permanent structure. The new building will cost $25,000 and will be finished next September in time for this year's show.

"Making Deliveries Deliver Profits" is the title of a small twenty-page 3¼ by 6¼ booklet just issued by the Chicago Pneumatic Tool Co., Chicago, and designed to give concrete and useful information on hauling methods in addition to describing the Little Giant trucks made by the Chicago Pneumatic Co. The booklet also makes mention of the help-the-owner department of the company, which is made up of transportation and engineering experts who will make special analyses of the businesses and hauling problems of prospective truck buyers. This service is free and does not obligate the man for whom the investigation is made to purchase a Little Giant truck. The booklet further describes Little Giant trucks in various lines of work and in addition gives a table showing the comparative cost of operation per day of a Model H 1-ton Little Giant and two two-horse teams which it is considered it can replace. The Little Giant line of trucks is also pictured and the specifications of each model given.

Motor Bus Lines Will Operate in Bermuda, the legislative assembly in that island having recently decided to repeal the present act prohibiting the use of mechanically-propelled vehicles of all sorts. It has appointed a committee to draft a bill providing for a restricted motor bus service under the control of the local government. It is probable that a bill, drafted along the lines mentioned, will pass both the assembly and legislative council and that a bus line will be inaugurated between Hamilton and St. George and between Hamilton and Somerset.

A General Goodyear Goods Catalog has just been issued by the Goodyear Tire & Rubber Co., Akron, Ohio, in which all the products manufactured by the company that can be used by motor vehicle owners and dealers are described, including tires, rims, tire savers, and mechanical goods, such as rubber hose, packing and matting. Special chapters are devoted to Goodyear service stations and to each of the general products as enumerated above.

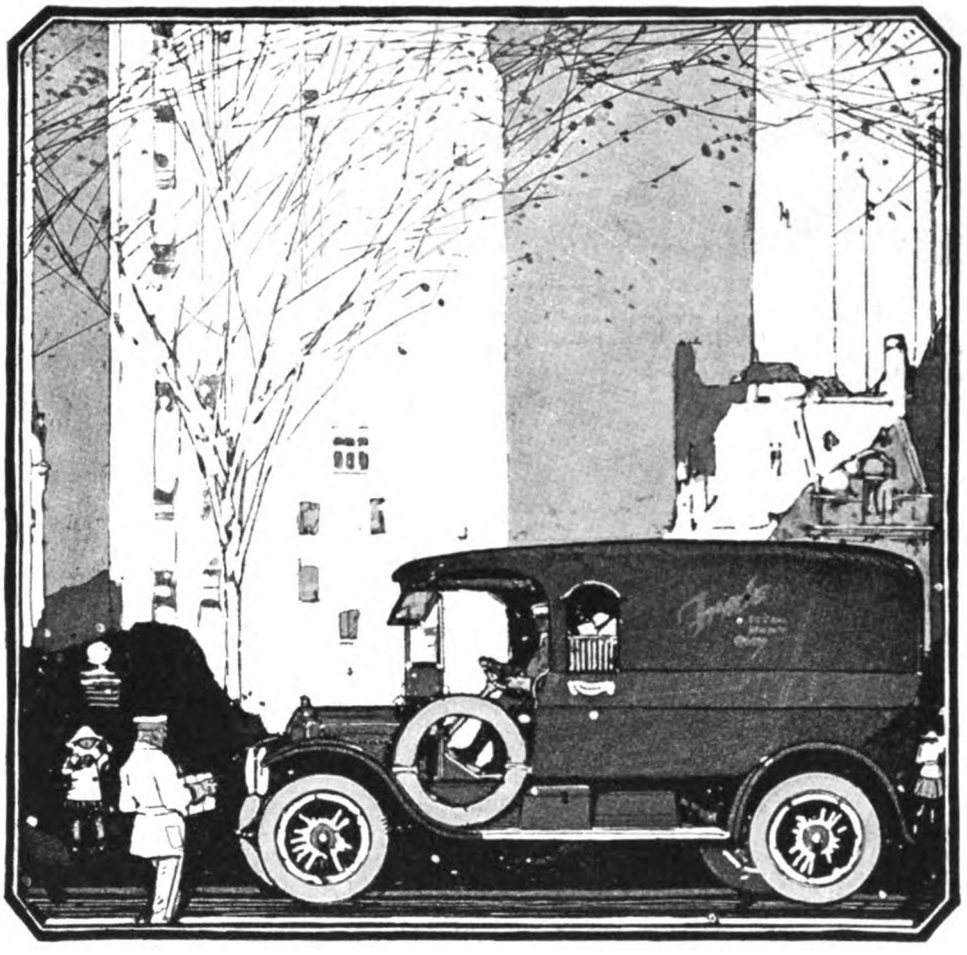
Motor Street Sweepers Are Wanted in Great Britain, according to the report of an American consular officer in the United Kingdom, which states that a municipality contemplates the purchase of a vacuum motor road sweeper and will probably purchase additional apparatus later if the initial one proves successful. Preliminary requirements call for a motor of 60 hp. and a sweeping brush 7 ft. 6 in. long and 4 ft. in diameter. Further information regarding the inquiry may be obtained from the United States Bureau of Foreign and Domestic Commerce at Washington, D. C., or from any of its branches in the principal cities throughout the country, by referring to Foreign Trade Opportunity No. 21724, as published in Commerce Reports for July 6, 1916.

"Liquid Measuring Pumps" is the title of a paper read before the Eleventh Annual Conference of Weights and Measures, United States Bureau of Standards, by F. J. Schlink, assistant physicist of the bureau. In it the author points out the importance of the measuring pump is principally due to the large quantities of gasoline sold as fuel for motor vehicles. He further describes the various types of gasoline measuring pumps now on the market and the methods of testing these for error. The author states that there are four main classes of measuring pumps for gasoline now offered on the market by about twenty-seven manufacturers. The most common type is the piston pump of either the single-acting or double-acting type, in which a plunger piston is used within a cylinder having stops which act to define accurately the limits of the piston stroke, and consequently the volume generated by the piston on each cycle. A second type of apparatus measures the liquid by passing it through a meter, its discharge being produced either by the displacement of the oil over water, by pneumatic pressure or by mechanical pumping. A third type of measuring system is founded upon the principle of overfilling a measuring chamber, supplying liquid until an excess is present over the normal delivery, and then removing the excess by abstraction to a definite level. In this system the liquid may be supplied to the measuring chamber by air pressure, by evacuating the chamber with a vacuum pump, or by direct mechanical pumping from the supply tank. A fourth type is a portable apparatus comprising a small storage tank and a measuring pump. In regard to testing any of these various types, the author points out that it is essential to determine whether the installation is free from inward leaks of air and outward leaks of gasoline. Leaks of either kind are fatal to accurate measurement and any adjustment made before the correction of defects of this kind cannot be expected to be permanently effective. The principal causes of short delivery of pumps of the piston type are leaking foot valves and the formation of air space under the piston resulting from excessive virtual suction lift or leaky piping, or piping tending to periodically retain vapor. Another source of error which should be guarded against in the design and installation of piston measuring pumps is the inertia of the moving column of liquid. The use of long filling hoses or those which cannot be drained are also the cause of short measure in some instances. The entire paper will be published in full as one of the Technologic Papers of the Bureau of Standards some time during July or August of this year.

Commercial Vehicle Agencies Recently Established Throughout the Country

Brookville, Pa.	Kisselkar	T. W. Stewart
Conemaugh, Pa.	Kisselkar	Spanogle & Bash
Dixon, Cal.	Kisselkar	C. B. Frese
East Troy, Wis.	Kisselkar	Dickerman Hardware Co.
Forest Grove, Ore.	Kisselkar	Sears & Watkins
Pine Bluff, Ark.	Kisselkar	Pine Bluff Buick Auto Co.
Stockton, Cal.	Kisselkar	Christensen Bros.
Tampa, Fla.	Kisselkar	Beckwith-Wilson Co.
Wilmington, Del.	Kisselkar	White Bros.
Winnipeg, Can.	Kisselkar	Breen Motor Car Co.

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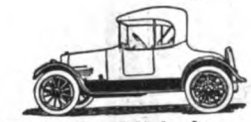
IN building motor trucks it is the policy of The White Company to make them highest grade at whatever cost. This policy is founded on the conviction that nothing less sturdy, or less refined, or less expensive, can efficiently and economically meet the actual requirements of motor truck service.

THE WHITE COMPANY
CLEVELAND

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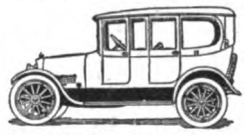
Announcing
The Reo Models and Prices
Two Important Price Reductions—Two Interesting New Models



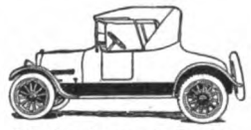
The New Four-Cylinder, 3-passenger Reo Roadster, $875



The New Reo the Fifth, "The Incomparable Four," $875



The New Four-Cylinder Reo Enclosed Car, $1025



The New 4-passenger Reo Six Roadster, $1150



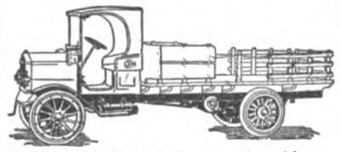
The New 7-passenger Reo Six Touring Car, $1150



The New Reo Six 7-passenger Sedan, $1750



1500-pound Reo "Speed Wagon," $1000



2-ton Reo Truck (Chassis only, with Driver's Seat and Cab), $1650

All Prices are f. o. b. Lansing, Michigan

YOU WANT TO KNOW—everybody always wants to know—what models Reo will make the coming year, and the price of each.

OF COURSE THERE ARE NO NEW MODELS—new chassis models we mean. You do not look for, do not expect, do not want new chassis models from Reo.

THAT ISN'T THE REO WAY. Refinements—of course. Detail improvements—wherever and whenever we can find a place to make them.

NOTHING RADICALLY NEW is ever offered to Reo buyers. For it isn't new when it gets to you—it has been thoroughly tried and conclusively proven before we let it get into a Reo car.

NEW BODY TYPES—YES—and some that put Reo in the highest class of cars in looks as well as in performance and longevity.

REO THE FIFTH COMES FIRST—not only among Reos, but among motor cars.

FOR THIS IS THE GREATEST automobile ever built, we verily believe.

THIS IS THE SEVENTH SEASON that Reo the Fifth has been standard in practically its present form.

NO: THE PRICE WILL NOT BE CHANGED this season. We will not increase—we cannot lower it.

ACTUAL COST OF MAKING is now more ($50 more) than when the present price, $875, was set a year ago. And we had made this model so long; had so refined and perfected manufacturing processes; had reached such a high state of efficiency in production; and cut dealers' discounts so low that we had, then, reached rock bottom.

IT WAS AN ACHIEVEMENT of the first magnitude to produce such a car and sell it at such a price—$875.

TODAY YOU SEE OTHERS increasing prices all along the line. They must do so. They have no choice.

ORDINARY BUSINESS RULES dictate that we also "tilt" the price of Reo the Fifth $50 at least.

BUT REO PRIDE PROMPTS that we absorb the extra cost, as we have for months past, and keep the price where it is until conditions will, happily, return to normal.

THE FOUR-CYLINDER ROADSTER—same wonderful chassis, same price, is the smartest thing on wheels—the most popular car in the world among physicians, and all professional and business men. Also $875.

TO SUPPLY A GROWING DEMAND for an enclosed body on Reo the Fifth chassis, we have planned to build a limited number. The top is rigidly supported at front and rear. Removable glass panels convert it into a veritable limousine for winter, and these discarded and with Jiffy curtains (which are also furnished) it is an ideal summer touring car. The price is $1025.

THE NEW REO SIX will continue in its present popular forms—the 7-passenger touring car and the classy 4-passenger roadster; and we will make a limited number with Sedan bodies to supply an insistent demand for this type of body on this splendid chassis.

THE PRICE IS REDUCED $100 on the 7-passenger and roadster models. Now $1150!

NOW YOU WONDER, and naturally, how we can reduce the price of the Reo Six models and not the Four—especially after what we have just told you about the increased cost of production.

SEEMS ILLOGICAL at first blush—doesn't it? But it isn't. For the truth is never illogical. And the truth is that despite the present higher prices of materials and labor still it costs us less to make this six-cylinder model now than a year ago

REO THE FIFTH SOLD FOR $1250 in 1912. Its price was reduced by successive stages from year to year as follows: $1175, $1050, and now is $875 f. o. b. Lansing.

SAME CAR?—No—an infinitely better car—for each year we have incorporated refinements and added equipment as the art has developed.

AND WE TOLD YOU EACH YEAR the reason for the reduction—that we had absorbed a portion of the initial—experimental, tool jig, die and special equipment—cost, and were giving you the benefit.

THIS POPULAR REO SIX is now in its third season. It has passed the same stages through which its great four-cylinder namesake went—initial costs have been absorbed, charged off. And in accordance with that unswerving Reo policy we give the buyer the benefit and set the price at $1150 f. o. b. Lansing.

WE WILL MAKE A LOT MORE of those 4-passenger Six Roadsters the coming season. We underestimated the appeal and the demand for this model.

HERE'S A THOUGHT FOR YOU: If you must "count the cost" you can't do better than to follow the lead of the millionaire in the selection of an automobile.

FOR THE MAN WHO CAN "afford to pay any price he likes" for a car, is the very man who doesn't. He insists on real value for his money—and his knowledge of values more often dictates a Reo than any other.

THE SIX SEDAN speaks for itself, though, truth to tell, an illustration does it scant justice.

YOU MUST SEE IT where you can study its artistic lines and faultless finish to fully appreciate this latest Reo which we price at $1750.

PRICE OF THE 1500-POUND REO "Speed Wagon" has been reduced to $1000.

SAME REASON—SAME POLICY—reduced cost of manufacture despite higher cost of materials—as enunciated in speaking of the Reo Six.

NEVER SINCE THE DAY this model was announced—and we made only one general announcement in the whole year—have we been able to supply the demand. Never, though the new Reo Truck plant covers 4½ acres of ground and is running to capacity.

AND THAT TWO-TON REO. What shall we say? What need we say? We submit, it is the greatest 2-Ton motor truck in existence. Has been standard for longer. Has given greater proof of its sturdiness and efficiency and low cost of upkeep.

IF WE ARE TO JUDGE by that over-demand, we may well assume that we could sell all that we could make were the price $2500, instead of $1650.

AND FINALLY A WORD about the big general plan—a brief reiteration of the Reo policy.

WE STILL ADHERE to our determination never to make more Reo cars or trucks than we can make and make everyone good.

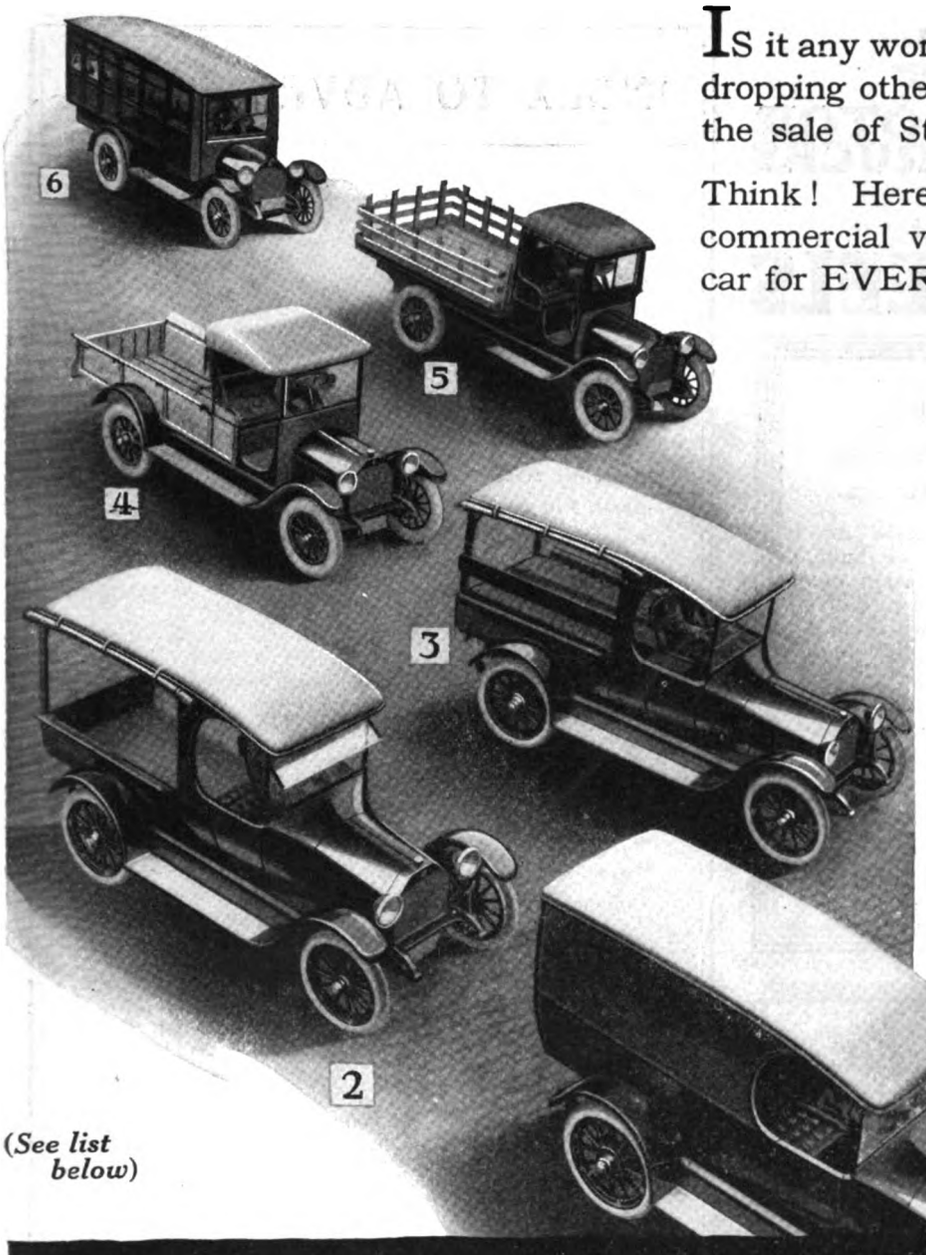
RATHER THAN INCREASE the quantity we shall strive always to improve the quality so that, as the art advances and cars generally improve, still Reo will continue to be known as —"*The Gold Standard of Values.*"

Reo Motor Car Company
Reo Motor Truck Company

Factories: Lansing, Michigan

"THE GOLD STANDARD OF VALUES"

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(See list below)

IS it any wonder that merchants are daily dropping other lines of business to take up the sale of Studebaker Commercial Cars?

Think! Here is a COMPLETE line of commercial vehicles — SIX of them — a car for EVERY business.

Each of the six cars is without a rival in its line—for each sums up not only Studebaker's wonderful experience of producing more than 260,000 pleasure cars — but 64 years of experience in manufacturing delivery vehicles of every conceivable nature.

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4.	Open Express	1200
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6.	Bus, 16 passenger	1400

F. O. B. Detroit

The opportunity that the sale of Studebaker Commercial Cars offers a progressive man can not be over-estimated. The use of motor vehicles in every line of business is increasing day by day. And to the men who get into the market EARLY, the opportunities are limitless. We invite every energetic man who looks ahead to building a lasting business, to write at once for complete information.

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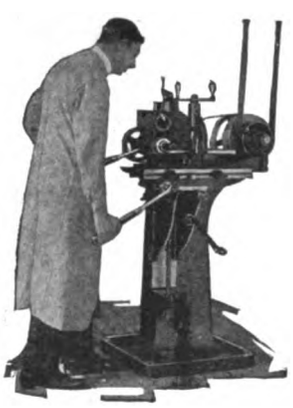
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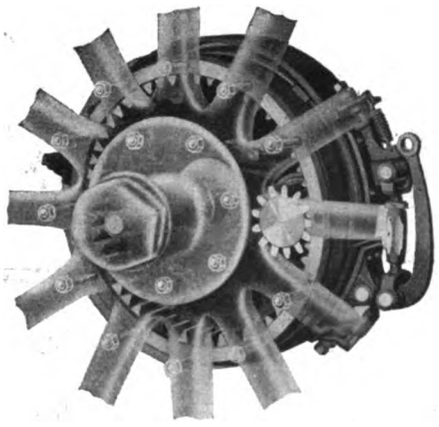
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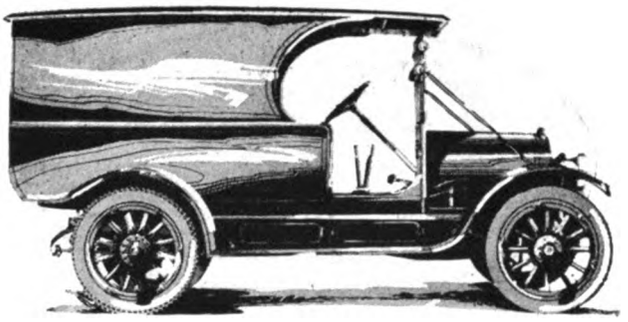
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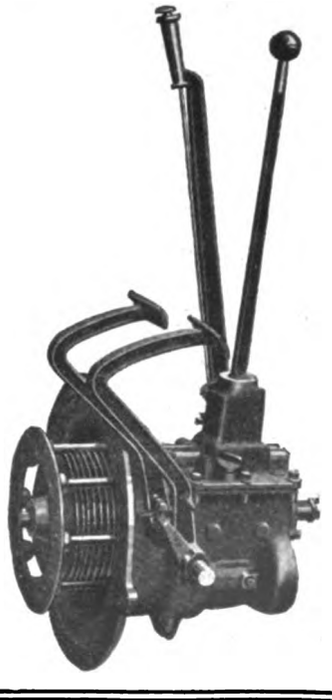
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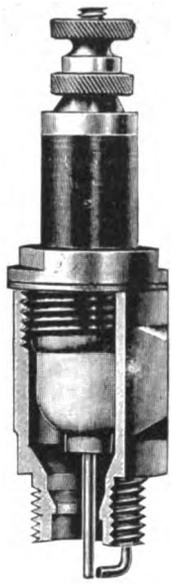
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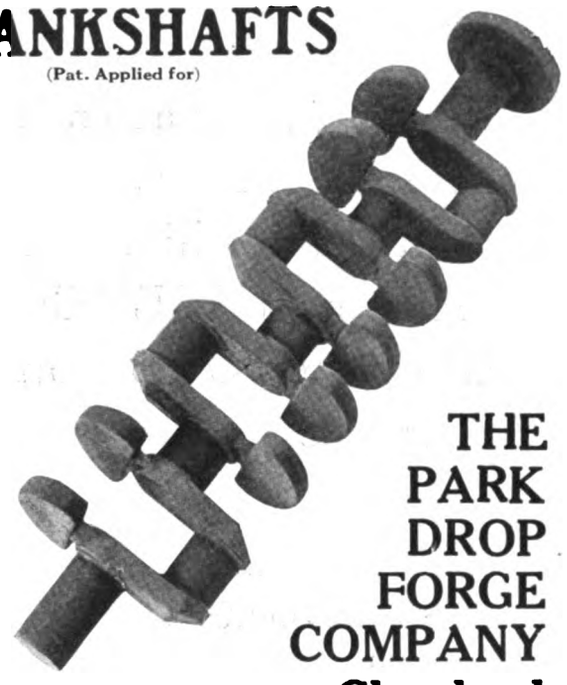
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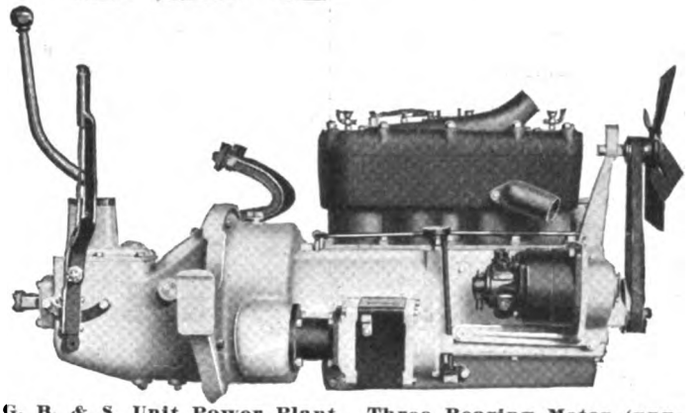


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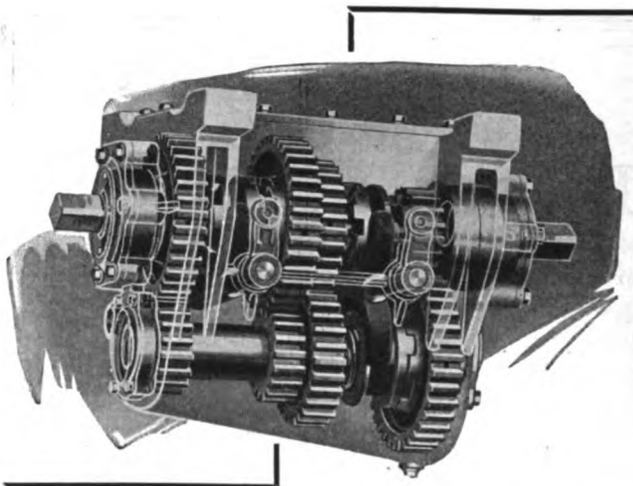
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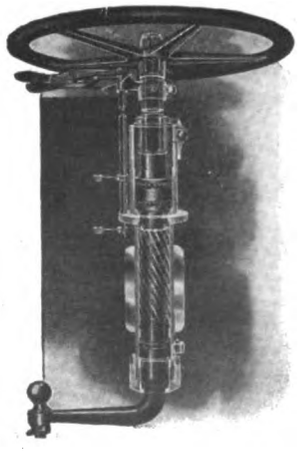
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on good motor truck construction
INVESTIGATE

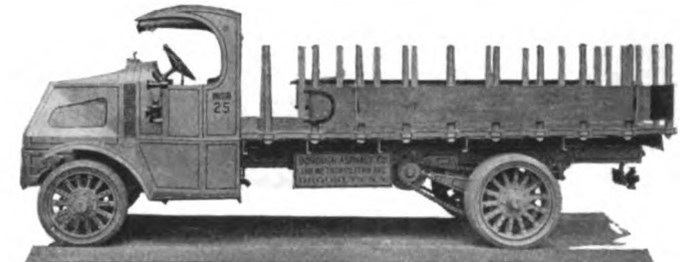


Fore and Aft Steering Gears Cross Type



Enormous bearing surfaces
Perfect Lubrication
Best material thruout
Finest workmanship

Ross Gear & Tool Co.
790 Heath Street
Lafayette **Indiana**



NEW *Mack* MODEL

The Mack "AC," illustrated above, is the latest addition to our extensive line of motor trucks.

The demand for this model has been so instantaneous and consistent that we have been unable to supply demonstration trucks for all of our representatives. Despite this fact, our salesmen have had no difficulty in taking *new* orders and *repeat* orders from specifications and blue-print drawings.

Doesn't this satisfactorily demonstrate Mack superiority?

International Motor Company
64th St. and West End Avenue, New York

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Standard

MADE IN DETROIT USA

Motor Trucks

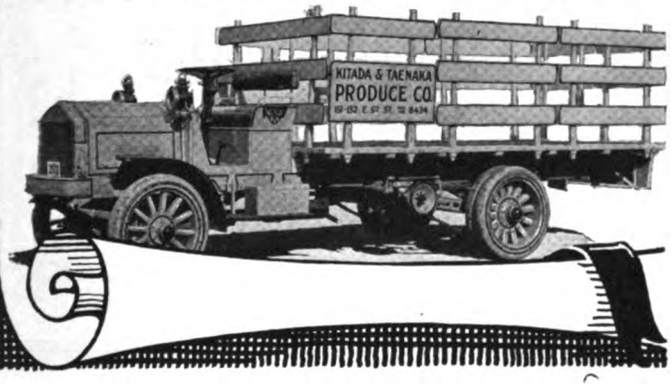
Startled the Motor Truck Industry By a Unique Sales Plan

First of all, the Standard is an unusual truck. It is a powerful combination of many of the world's best-known units—the Continental Motor; Timken Axles; Timken Bearings; Brown-Lipe Gears, and other well-known standard parts.

The Standard Motor Truck is sold in an unusual way. Any responsible person can be the agent for the Standard, with absolutely *no investment—no deposit* and *no contract.*

Write for details of this plan. No obligation.

STANDARD MOTOR TRUCK CO., Dept. 10, Detroit, Mich.



DON'T

throw your old bearings away just because they are worn or broken.

We regrind the raceways (without drawing the temper) insert new balls and retainer AT about one-fifth the cost of a new bearing.

Any broken or worn bearing can be exchanged at any of our service stations, for reground bearings of any type or make, which are guaranteed equal to new.

These stations also carry complete stocks of New Single Row Annular, Thrust, NEW DOUBLE Row and Radax Bearings.

Write for Catalogue "U" and further information

Ahlberg Bearing Company

2636 Michigan Avenue **Chicago, Ill.**

BRANCHES

New York, 1790 Broadway — Cleveland, 1841 Euclid Ave.
Boston, 93 Massachusetts Ave. — St. Louis, 2831 Locust St.
Detroit, 790 Woodward Ave. — Los Angeles, 325 W. Pico St.
Minneapolis, 926 Marquette Ave.



Throughout the United States

the unprecedented increase in all kinds of business has confronted merchants with delivery problems which must be solved. Their delivery zones must be enlarged and delivery efficiency and delivery economy must go together.

The answer to the problem is the

Commerce Truck

THIS CHASSIS OF 1500 LBS. CAPACITY with standardized component parts meets the gasoline situation fairly by giving the greatest mileage per gallon of any commercial vehicle of equal capacity. The first cost is low and the upkeep expense is very little, owing to the simplicity and quality of material and workmanship.

To truck dealers this line offers exceptional opportunities for large sales at this period of big business. Those who own Commerce Trucks will buy more and many who have relied on horse-drawn vehicles will now be in the market for motor trucks.

DEALERS send today for our proposition. Get specifications of our chassis and line of bodies. There's a big field for you. The time to coin money and build up your business is now—the vehicle to do it with is the Commerce Truck.

Commerce Motor Car Co., Detroit, Mich.

W. H. BRINKERHOFF, Eastern Representative
12 Belmont Ave., Elmhurst, Long Island, New York



Cullman Sprockets

For Diamond, Baldwin and Whitney Chains

Differentials

Sprockets in stock and to order

Send for Catalog

Cullman Wheel Co.

1350 Allgeld Street
CHICAGO

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Just as easy!



Heavy Duty Hoist with Standard Coal Dump Body

EASE of operation is one important reason for WOOD hoist supremacy. There are, naturally, others.

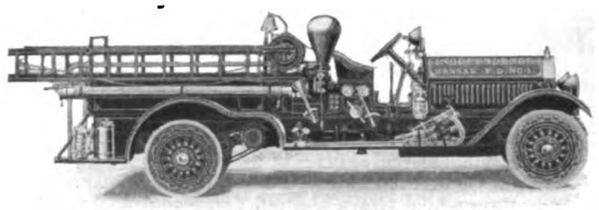
NINETY per cent of the truck makers in this country list WOOD bodies as standard equipment—*why?*

Talk it over with your dealer today

WOOD HYDRAULIC HOIST AND BODY CO.
DETROIT

WOOD HOISTS
WOOD BODIES

FIRE!



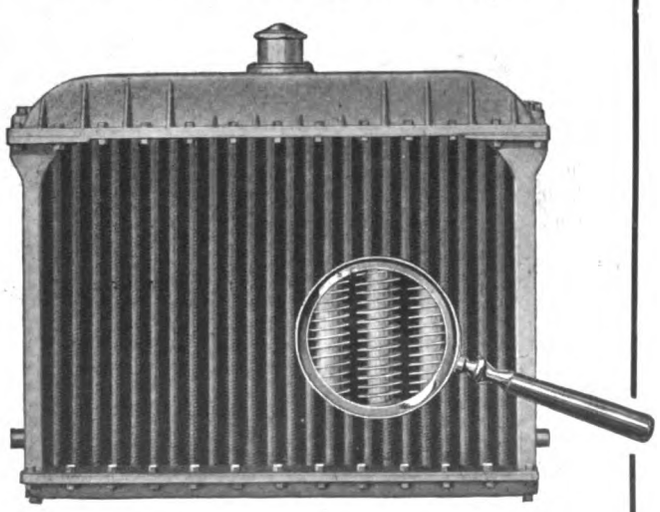
SOUTH BEND DOUBLE DUTY FIRE APPARATUS

Built for SERVICE

Reliability and Efficiency

SOUTH BEND MOTOR CAR WORKS
SOUTH BEND, IND.

Seamless Copper Helical Tube Cooling Sections



Are Guaranteed for the Life of the Motor on Which They are Installed

Helical Tube Construction is Accepted as the Best by the Leading Truck Makers of America

Manufactured only by

ROME-TURNEY RADIATOR CO.
ROME, NEW YORK

NORTH AMERICAN MOTORS

4-⅜ in. x 6 in.—45 H. P.—1200 R. P. M.

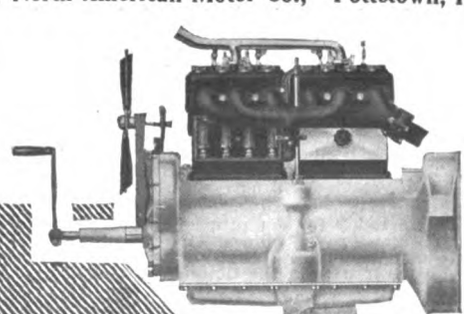
Expressly Designed to Take Care of the Most Exacting Conditions in Truck Service

Model N is a Long-Stroke Motor with a Tenacious Pulling Power—the very essential demanded by successful builders of motor trucks.

Rich with such features as Timing Shaft driven by Silent Chain, Speed Governor, Valves all on one side, enclosed and easily accessible by removable plates, and intake and exhaust manifolds on one side, with magneto on opposite side, removed from heat of exhaust manifold.

There are other good reasons why you should use the North American Motor. Let us tell you about them and quote prices.

North American Motor Co., Pottstown, Pa.



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Russel
Internal Gear Drive Axles

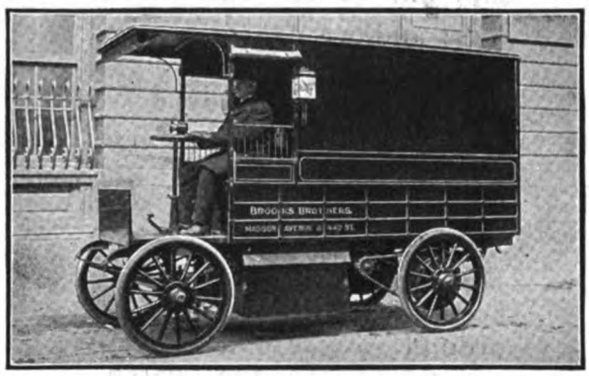
SELLING trucks these days is not difficult, for the industries of the country are awakening to the advantages of motorized delivery.
Make your sales even easier by using trucks driven by the Russel Internal Gear Drive Axle.
Industrial preparedness demands that the most serviceable, durable and efficient form of truck haulage be adopted by you.

Adopt, therefore, a truck using The Russel Internal Gear Drive Axle

Russel Motor Axle Co., North Detroit

G. V. ELECTRIC TRUCKS

SIX MODELS: 1,000 POUNDS TO 5 TONS



Nearly 5,000 in use
Catalog on request

General Vehicle Company, Inc.

GENERAL OFFICE AND FACTORY
LONG ISLAND CITY, NEW YORK

NEW YORK::CHICAGO::BOSTON::PHILADELPHIA

1664

Garford

Garford Trucks range from 1500 pounds to six tons in capacity.

They are designed and built by men who have spent their lives in the study of motor trucks.

They are backed by one of the strongest organizations in the industry.

Bodies are provided to meet all requirements.

Write for catalog. Please address Dept. 103

The Garford Motor Truck Co., Lima, O.

"Little Giant"

The Truck for All America



—for eight long years Little Giants have proved themselves—their big efficiency—solid service—real economy. They are backed by every dollar of the more than $11,000,000 capital and resources of Chicago Pneumatic Tool Company—a twenty-two-year-old concern with 25,000 active customers—eight great factories in this country and abroad—branch houses, agencies and service stations almost everywhere.

Write for Booklet — Mailed on Request
"Making Deliveries Deliver Profits"

Dealers:—Write for interesting proposition

CHICAGO PNEUMATIC TOOL COMPANY

Dept. P., 1615 Michigan Ave., Chicago
239 West 50th St., New York

THE LITTLE GIANT LINE

Model 15—1-ton Worm Drive, Chassis Price	$1500
Model H—1-ton Chain Drive, Chassis Price	$1400
Model H—1½-ton Chain Drive, Chassis Price	$1500
Model 16—2-ton Worm Drive, Chassis Price	$2500

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By Jingo!—
That's Real Service

said one of our customers.

Yes! and we can give *your* felt orders the same prompt attention if you'll let us.

Why not try doing business with an A-1 house and get "what you want when you want it"?

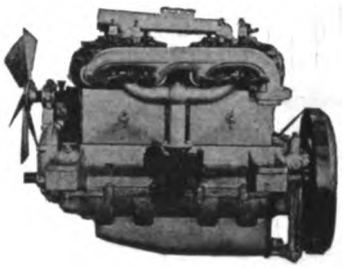
Dependable goods only; accuracy in manufacture, prompt service and attractive prices are the watchwords of our business.

"If it's made of felt, ask Booth"

Write—Wire or Phone

The Booth Felt Co., Inc.

440-450 Nineteenth St., Brooklyn, N. Y.
116-118 South Fifth Ave., Chicago, Ill.
12th St. and Grand Trunk R. R., Detroit, Mich., 'Phone, Market 5884



Beaver Motors Make Their Way By The Way They Are Made

BEAVER MOTORS are made by truck motor specialists. The concentrated experience of engineers of international reputation is embodied in their construction.

BEAVER TRUCK MOTORS are made by men who make nothing but motors—who, by doing the same thing over and over have become masters in perfection. That is why we can make truck motors better, quicker, and at less cost than the truck manufacturer himself.

We make truck motors of all sizes, for all requirements. No matter whether you are building a 1,500 pound light delivery wagon or a 5-ton truck, we can meet your demands for power, economy and dependability.

Do not determine on a motor for your truck till you have sent us your specifications

BEAVER MFG. COMPANY
Milwaukee Wisconsin

BOSSERT

ADVANTAGEOUS CONSTRUCTION

Pressed steel can be advantageously used instead of malleable iron, steel castings and drop forgings in many of the parts necessary to truck construction.
The result will be a reduction of gross weight and a lowering of manufacturing cost per vehicle without in any way sacrificing strength.

"THE BOSSERT WAY"

assures not only the highest grade of material properly treated and accurately pressed, but also the delivery of all orders on the day agreed on.
Among the score of truck parts we make are pressed steel spring hangers, running boards, brake drums, etc., etc.
Our Engineering Department will gladly confer with you relative to the use of pressed steel parts.

THE BOSSERT COMPANY,
Utica, N. Y.



The Long Distance Electric

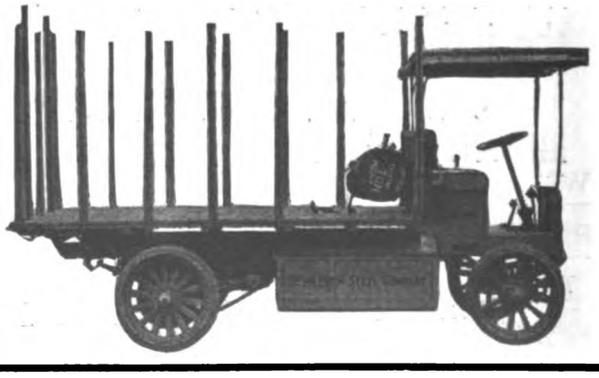
In all problems of heavy service electricity is the most dependable, economical, and satisfactory power.

Atlantic Electric Trucks are built in ½, 1, 2, 3½ and 5-ton models. Guaranteed to give 15% more mileage than any other electric truck of equal capacity and same equipment.

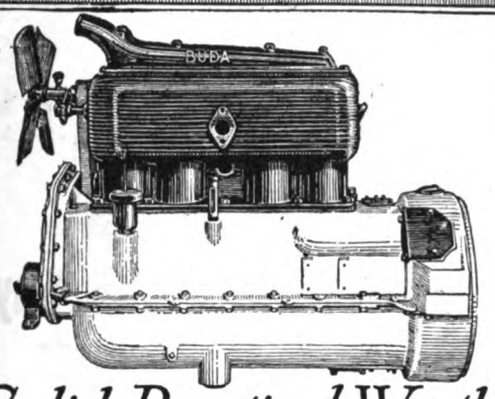
Hundreds of users unhesitatingly endorse the known superiority of Atlantic Long Distance Electric Trucks. Our new models have every proven safety factor in construction; modern steering apparatus, allowing driver extreme latitude and flexibility in traffic, maximum traction, smoother rolling, scientific load suspension, etc. Every truck carries with it a guarantee of faithful performance, adequate service, and mileage plus beyond your requirements.

The experience of our experts in handling delivery problems will be of value to you. Let us know your requirements. Our recommendations entails no obligation.

Atlantic Electric Vehicle Co.
Vanderbilt Bldg., New York.
Main Office and Factory, Newark, New Jersey



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Solid, Practical Worth

in the highest possible degree is the goal successfully attained by the,

BUDA TRUCK MOTOR

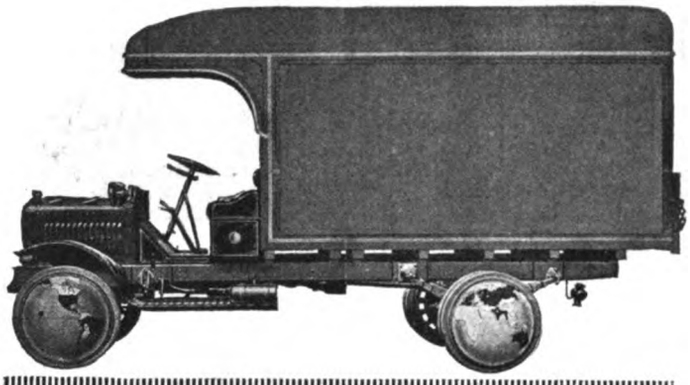
Truck value is practically determined by the efficiency and durability of the motor. The value of *your* trucks should be insured by the 35 years of manufacturing integrity which stands behind the Buda Motor.

The BUDA COMPANY
HARVEY CHICAGO SUBURB ILLINOIS

Models for all trucks.

THE BUDA COMPANY BUDA MOTOR "The part to buy the car by" ESTABLISHED 1881

Models for all cars, too.



WICHITA TRUCKS

Dependability Plus Extensive Service

ARE YOU THE DEALER

who can put into your salesmanship WICHITA Energy and Spirit and back up your selling accomplishments with WICHITA Service?

If you are such a dealer, we have an interesting selling plan that you will not want to miss considering.

The faithful co-operation of our factory organization will give you encouraging help.

We want live dealers NOW—Men who will interest concerns in our heavy-duty trucks, and then to not let up on them until they sell them.

Request us to immediately submit our plans.

WICHITA FALLS MOTOR COMPANY
Arthur Boulevard, Wichita Falls, Texas

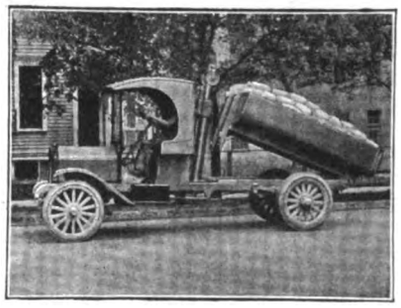
WICHITA TRUCK WICHITA FALLS MOTOR COMPANY WICHITA FALLS, TEXAS, U.S.A.

Stegeman

SIX-CYLINDER
SELF-STARTER

WORM-DRIVE

TRUCKS



The most for your money—that's what we offer. A 6-cylinder Motor, Electric-Starter and Electric-Lights are furnished on our truck without extra charge. On any other machine they would cost $300 extra.

Ours is not the cheapest truck on the market, but it is certainly a low-priced line, quality considered.

WE WANT RELIABLE AGENTS

STEGEMAN MOTOR CAR CO.
Milwaukee, Wisconsin

NUTTALL GEARS

FOR TRACTORS **FOR TRUCKS**

One guarantee of satisfactory service from truck or tractor is the use of Nuttall Gears in the drive.

For 25 years Nuttall Gears have proved themselves efficient in every kind of heavy duty drive, and they have kept pace with the developments in the truck and tractor fields.

Perfectly cut, properly treated—they render highly efficient service over a long life. Now used on many of the better machines and being adopted by more.

We are glad to give dealers complete information on gears and their service.

NUTTALL **PITTSBURGH**

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M&S DIFFERENTIAL

THE success of the M & S on the Jeffery Quad and the overwhelming evidence of severest tests long since established "the differential that pulls both wheels" as the ideal one for commercial motor vehicles.

Write for interview or send in your specifications.

M & S GEAR COMPANY
166 Lycaste Street
DETROIT

SELDEN TRUCKS

Dealers can afford to wait for our new announcement and attractive selling proposition.

A full line of Commercial Vehicles from a 1500 lb. Delivery Car to a 3½ ton Truck.

All Ready by September

SELDEN TRUCK SALES CO.
Rochester, N. Y.

The Star Union Brewing Co., of Peru, Ill., is duplicating—

The Worm Drive GARY TRUCK

—now on duty in Peru, for its Peoria branch.

It's the same story we've had to tell ever since GARY Trucks first became established in the field—50% of our business is repeat orders from GARY owners—the best recommendation for Gary service.
Every refinement known to increase efficiency is incorporated in the GARY Truck, by expert workmen.
The result is 4 GARY models, 4 capacities at 4 prices that are right—ready to handle any load you want to move—and to give satisfaction that will make you come back for more.
Try one GARY in service with any assortment of best known trucks. Your fleet will eventually be a GARY fleet.
Dealers—Reorders and generous new business make GARY the logical truck for dealers.

Write or wire for details

THE GARY MOTOR TRUCK COMPANY
610 Broadway
Gary, Indiana





WHAT CAN HE DO?

When the inevitable emergency arrives, and the brake lining won't grip, all the driver can do is trust to luck.
And luck is all you can trust to, if you have loosely woven brake lining which is friction-surfaced only, and which becomes treacherous as soon as the surface is worn smooth.

Thermoid HYDRAULIC COMPRESSED Brake Lining-100%

Is ready for every emergency; its grip is mighty, sure and instantaneous; it has more than sufficient friction (gripping power) even when worn paper thin. The life of a truck, the lives of human beings, often depend upon brake lining—insist that yours be Thermoid.



OUR GUARANTEE
Thermoid Brake Lining is absolutely guaranteed to give more satisfactory results and to outwear any other lining manufactured. Not affected by heat, oil, water, gasoline or dirt.

Thermoid will make good or we will

THERMOID RUBBER COMPANY
Trenton, N. J.

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A STYLE FOR EVERY BUSINESS

International Motor Trucks, in three sizes, 1000, 1500 and 2000 lbs. capacity, are now furnished in styles to meet the needs of every business. Two or four cylinder motors; chain drive, or shaft; solid tires or pneumatic; high wheels for country road driving or low wheels for work on city streets; any desired style or size of body—all the advantages which a great organization gives are at the service of International Motor Truck purchasers.

New Models—Attractive Prices

M—1000 lbs. capacity, complete with express body	**$710**
E—1500 lbs. capacity, complete with express body	**950**
H—1500 lbs. capacity, internal gear drive (chassis)	**1225**
F—2000 lbs. capacity, internal gear drive (chassis)	**1500**

Any model can be equipped with pneumatic tires for $50 more than the above prices. All prices are cash f.o.b. factory.

International Motor Trucks may be seen at any one of the 87 completely equipped service branches scattered throughout the United States. This network of gratifying service has contributed not a little to the popularity and success of the International. Write for catalogue and any special information you may desire.

INTERNATIONAL HARVESTER COMPANY OF AMERICA
(INCORPORATED)
155 Harvester Building Chicago U S A



PRICE $540

The SHERIDAN 1000 Pound Commercial Car Sells Fast — QUICK Profits

The reason there are still thousands of horses making slow and uncertain deliveries for thousands of small merchants and draymen is the absence, until now, of an efficient light delivery car at a reasonable price.

The SHERIDAN Commercial Car fills the gap. Costs about the same as good horse-drawn equipment. Does four times the work in much less time.

Thousands of prospects waiting everywhere. Every man can afford the SHERIDAN. Chassis only, $490. $540 fully equipped. Ready now for immediate delivery. Write or wire for territory and details.

For prompt attention address desk 6

SHERIDAN COMMERCIAL CAR CO.
1509 Michigan Ave., Chicago
Factories: Harvey, Ill.

F.O.B. Harvey, Ill.

Chassis price $490

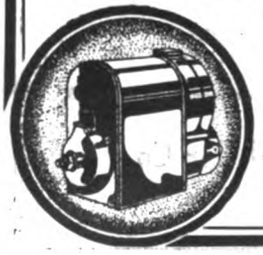
Efficiency—Dependability—Durability—the Hot Spark at *Low* Speed, which means Easy Starting, a Quick Pick-Up, Flexibility.

These are the very definite reasons which account for the fact that the

EISEMANN MAGNETO

has been adopted as standard equipment by 108 manufacturers (72 Trucks, 11 Pleasure Cars, 25 Miscellaneous).

Their decision has resulted from their conviction of Eisemann superiority. It is based upon facts, not mere opinions. The reasons that decided them are the reasons that should decide you.



THE EISEMANN MAGNETO CO.
Sales and General Offices:
32-33rd Street Brooklyn, N. Y.
Indianapolis, Ind., 415-417 N. Capitol Ave.
Detroit, Mich., 802 Woodward Ave.

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The
GLOBE TRUCK
6 Cyl. 1-Ton



The Globe Six Truck has

Greater Pulling Power
Greater Flexibility
Greater Mileage per gallon of gas
Extreme Quietness
Extreme Lack of Vibration
Standard Parts Thruout
and is a quality truck in every way.

Mr. Dealer, are you alive? Write for distributing proposition at once.

Globe Motor Truck Co.
Northville, Mich.

Krebs

"The Truck That Thinks"

The ideal commercial truck possesses four essentials — Simplicity — Low Maintenance Cost—High Efficiency and Absolute Dependability—That's the KREBS.

It is powerful, economical and needs no mechanic to drive it. The driver has nothing to do but steer.

The KREBS Automatic Governor positively keeps the motor at a certain speed and is assurance against the results of reckless driving.

Continental Motor, Timken Axles, Special economical KREBS Carburetor, Timken-Brown Worm Drive — are a few of the important essentials.

In ¾, 1, 2, 3, and 3½ ton capacities with bodies for any business.

Send for catalog—it will show you why you need the KREBS —the most efficient truck in the world.

The Krebs Commercial Car Co.
CLYDE, OHIO, U. S. A.

When a Man Buys a Truck

the first thing he wants to know is what kind of a motor it's got. He wants to be sure first of all of the power plant. He wants a motor with a record behind it, a motor that other truck owners have tested out for him, that they have found stands up to the grind of hard, gruelling work day in and day out, year in and year out.

Wisconsin
CONSISTENT
Motors

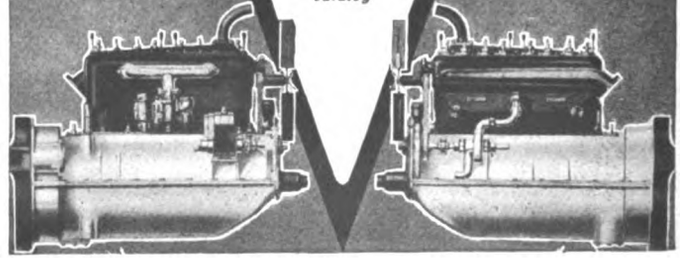
have won their high standing because of the service they have given. They are durable, economical, dependable.

Type T-U
4 in. bore,
6 in. stroke
Intake View

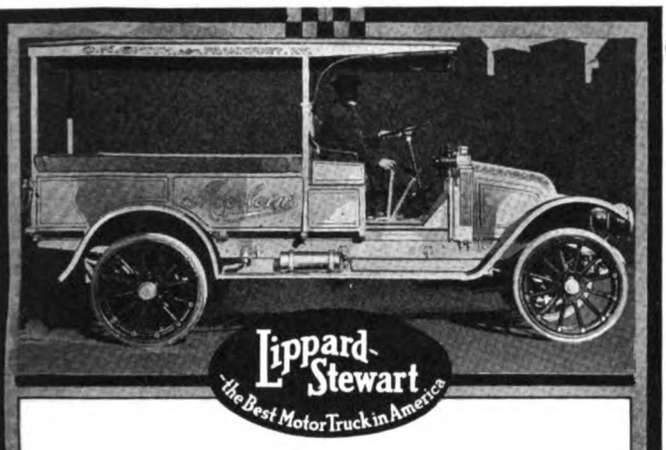
Wisconsin Motor Mfg. Co.
Station A, Dept. 319
Milwaukee, Wisconsin

Write now for special catalog

Type U-U
4¼ in. bore,
6 in. stroke
Exhaust View



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Follow the Leader

Some men lead—while others follow. Some trucks are leaders — while others are content with imitation.

The Lippard-Stewart is a pioneer—designed, built and sold by men who are leaders.

Worm drive, flexible frame construction, radiator-at-the-dash—these are a few of the features that were found **first** in the Lippard-Stewart.

This leadership has perfected a motor truck distinctively different from all other trucks. Different because it requires little or no after-service; different because it is equally adapted, thru the various models; to either light delivering or heavy hauling; different in that it performs as well in its third or fourth year as it does in its first demonstration.

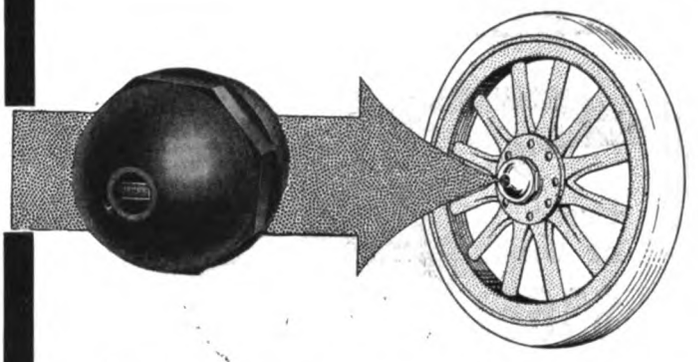
This leadership has created a truck with a wealth of selling points, and an unmatchable record for efficiency in over one hundred industries.

From the standpoint of pride, profit or prestige, the Lippard-Stewart is the —Best Motor Truck in America— either to sell or to use.

Dealer or user—write for the whole story.

Lippard-Stewart Motor Car Co.
233 West Utica St., Buffalo, N. Y.

½ TON, ¾ TON, 1 TON,
1½ TON AND 2 TON TRUCKS



Are your trucks costing too much?

Do you know how much per mile your trucks are costing—your tires, your fuel, your oil, your driver? There may be a hole through which dollars leak every day. Find the leaks and stop them with the

DREADNOUGHT *Indestructible* Hub Odometer

It gives an accurate daily record of your mileage—enables you to operate your trucks at top efficiency. The Dreadnought is the simplest, most accurate and most reliable mileage-recording device made.

Always working, always reliable. Mechanism protected by heavy cast housing. Guaranteed indestructible even in collision. If you knock it off or break it, we'll replace it free.

Easy to Read

Figures do not revolve—can't be obscured by grease or dust. Accurate readings assured.

RECORDOGRAF

gives an accurate tape record of every move of your truck during the day. May be attached to any vehicle. Shows:

Time truck is moving—
Time truck is still—
Distance travelled—
Speed at all times.



Write for booklet and prices and see at what little cost you can stop your delivery leaks.

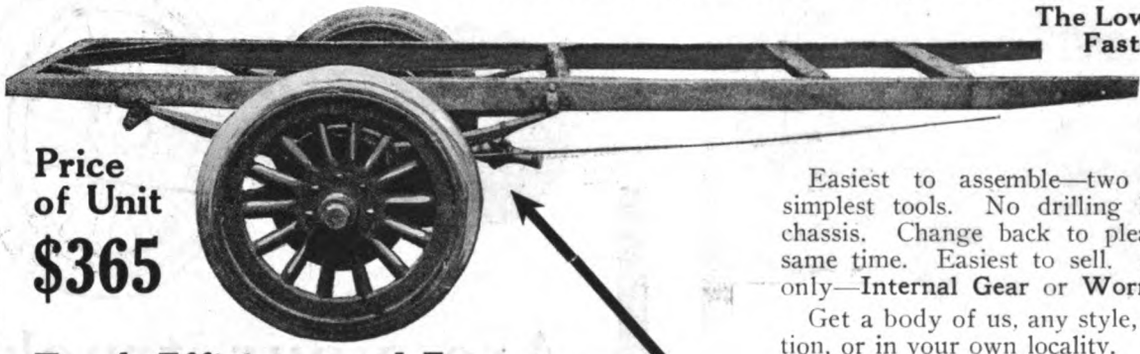
AMERICAN TAXIMETER COMPANY
Mfrs. of Jones and Popp Taximeters
1765 Broadway New York City

Service Stations in the Following Cities:
San Francisco New Orleans Washington Chicago Detroit
Philadelphia Seattle Boston Pittsburgh St. Louis

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KELLEY CONVERTIBLE AUTO TRUCK

The Lowest Priced, Fastest Selling Truck Unit Made



Price of Unit $365

Easiest to assemble—two hours' job, simplest tools. No drilling holes in car chassis. Change back to pleasure car in same time. Easiest to sell. **Shaft Drive** only—**Internal Gear** or **Worm Drive.**

Get a body of us, any style, on specification, or in your own locality.

Truck Efficiency and Economy

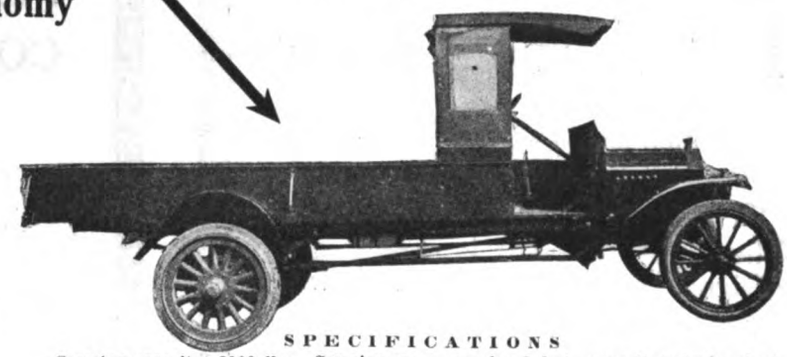
For simplicity of construction and attachment, strength, and utility unequaled by any other rear system.

Makes a **One-Ton Truck** (with capacity of 50 per cent overload) of any light pleasure car—Ford, Maxwell, Chevrolet, and a number of others. Also larger cars on special order.

Our Dealers Make Big Money!

Territory to responsible agents. Write for details.

Kelley Convertible Auto-Truck Co.
NOT INC.
Sales and Executive Offices:
332 Michigan Ave. Chicago, Ill.
FACTORIES: JOLIET, ILL.



SPECIFICATIONS

Carrying capacity, 3000 lbs. Carrying space—regular 9 feet, more if desired; wheelbase, 127 inches, more if desired; tires, 32x3½ inch solid; speed, 15 to 25 miles per hour; gear ratio can be adapted to any conditions under which truck is to be used; brake on rear wheel, 1⅞" face, 16-inch drum; tread, standard 56 inch.

"Big mileage—easier riding—save on upkeep"

By equipping with

GOODRICH DE LUXE TRUCK TIRES

(MADE IN 5 INCH 6 INCH AND 7 INCH WIDTHS)



After 7,500 miles of service, these De Luxe Tires on the truck of the Koken Barber's Supply Co., St. Louis, had worn down less than an inch. Comparison of the duals in service is made with cross sections showing full height of De Luxe tread—an inch more than Regular.

THE "*why*" of *big mileages* and *lowered operating costs* resulting from the use of GOODRICH DE LUXE TIRES can be answered by any one of thousands of satisfied users in all forms of business, in all sections of the country. We'll quote from one at random—James Hamilton, meat packer of Philadelphia.

"After 10 months in service, De Luxe tires on my 1½-ton White have gone 16,000 miles and have worn down about one inch. (*Two inches still available for wear.*)

"Another point I do not wish to overlook is the added cushion which I received from these high section De Luxe tires. This added cushion not only makes for easier riding but saves considerable in repair bills."

—This *added cushion* of thick, durable, resilient tread rubber between the road and load is what makes GOODRICH DE LUXE TIRES the *best* and most *economical* "shock absorber" that can be placed on a motor truck.

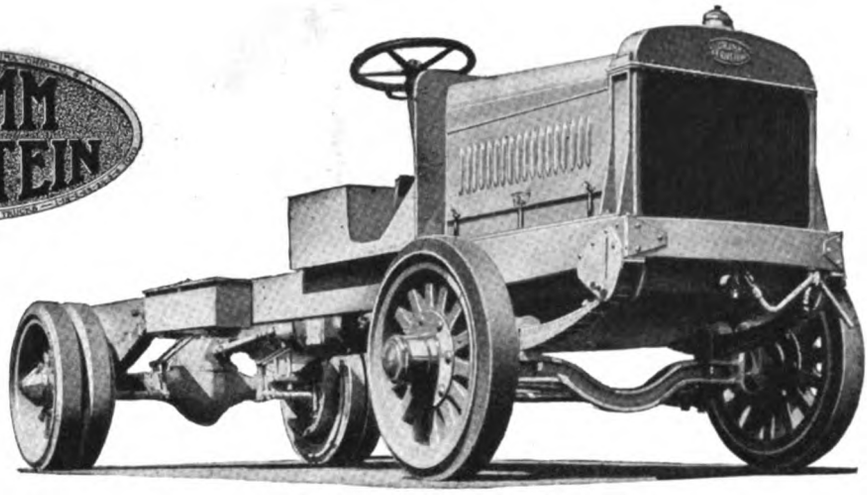
—*One* test will convince *you* that the De Luxe principle in truck tire making is right; and that the result of specifying them will be fewer truck lay-ups; longer life to trucks and tires; a decrease in maintenance costs.

Don't you experiment! Write for "*Decreasing Truck Vibration*" *the booklet which tells the entire De Luxe story.*

THE B. F. GOODRICH COMPANY, Akron, Ohio
Makers of the Celebrated Goodrich Automobile Tires—
"Best in the Long Run"
Service Stations and Branches in all Principal Trucking Centers

Digitized by Google

GRAMM BERNSTEIN



If You're Any Sort of a Truck Salesman Now, You'll Be a Whirlwind With the Gramm-Bernstein

Gramm-Bernstein Trucks almost sell themselves. The Gramm-Bernstein line is complete. It includes *1 ton, 1½ ton, 2 ton, 2½ ton, 3½ ton, 5 and 6 ton trucks.*

The new Gramm-Bernstein sales policy backs your efforts—gives you a *generous share of the profits.* Bigger percentages as the business grows.

Gramm-Bernstein *advertising, in the papers of your city,* stirs up prospects and begins convincing people before you talk to them.

The Gramm-Bernstein Sales Service gives you *the aid of the some of the most experienced and successful truck salesmen* in the country—when you need it, to close a sale.

No wonder dealers and salesmen all over the country are wiring and writing for territory.

Gramm-Bernstein Policy Lands Livest Dealers

Our first advertisement calling for additions to the Gramm-Bernstein ranks has met with a *splendid response on the part of established dealers and truck salesmen.*

We want to hear from you if you're selling trucks or can sell them.

It doesn't make any difference whether you're *working for yourself or the other fellow.* We want to get in touch with you. We want to put up the Gramm-Bernstein proposition to you, point by point.

Gramm-Bernstein Co.
Lima, Ohio, U. S. A.

Tell Us About Yourself

Who are you? How long have you sold trucks? What territory interests you? *Don't hestitate to write us* even if you've had small experience. If you've got the "selling sense" we have a message for you.

Don't let the fact that you are already selling other trucks interfere. Get our story. It's so new, so different, so *profitable,* that you'd better *know it at least,* even if you can't accept it. It's good policy sometimes to decide whether you want somebody else in your community to have a certain advantage—or whether you want it yourself.

Write, Or Better—Wire

Use the coupon at the bottom of the page or a telegraph blank. We suggest the latter in view of the avalanche of returns we've had from our first advertisement.

No Obligation, So Get Our Proposition

You're not tying yourself up in any way when you write or wire us. We give you every feature of the Gramm-Bernstein offer—*you decide.*

Fill out coupon—or wire. But *act now.*

Applications considered in order of receipt.

MAIL COUPON—OR WIRE

GRAMM-BERNSTEIN COMPANY
13 Gramm Blvd.
Lima, Ohio, U.S.A.

Please send me complete explanation of your new sales policy on Gramm-Bernstein Trucks, including reasons why it will pay me to handle the line, the advertising you will do for me in my local papers, the Dealer Sales Service, etc.

Name _____

Street and Number _____

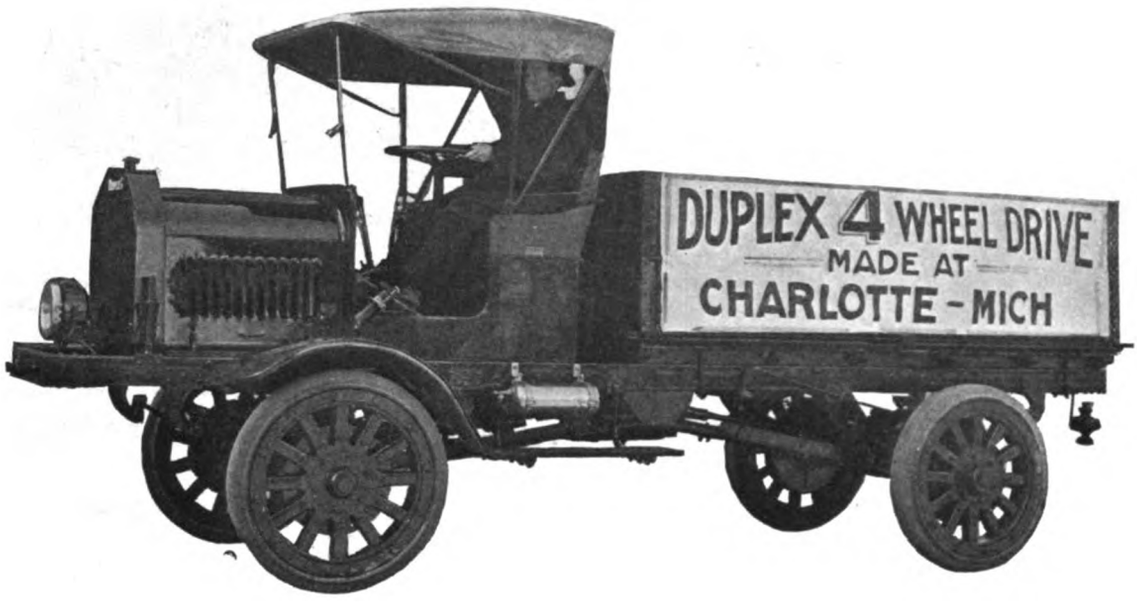
City _____ State _____

I {am / am not} representing a truck at the present time.

(If you are representing a truck at present please give the name of it here.)

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DUPLEX 4 WHEEL DRIVE



The Truck of Earning Efficiency

This cut represents the Duplex 4-Wheel Drive Road Truck, and is one of many others hauling one hundred and fourteen yards of gravel every twenty-four hours, a distance of 7.7 miles and at $1.00 per yard, earns $114.00 per day.

This truck with trailer has Duplex Side Dump Body which dumps its load without stopping the truck.

The Duplex with its light operating expense as well as upkeep, makes it the foremost truck for Road Construction purposes upon the market regardless of capacity.

Made in two- and three-ton capacity

Manufactured by

DUPLEX POWER CAR CO.

CHARLOTTE, MICH.

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From the Northeast—
Showing New Addition.

Views of the Enlarged Factory of the

BROWN-LIPE-CHAPIN COMPANY

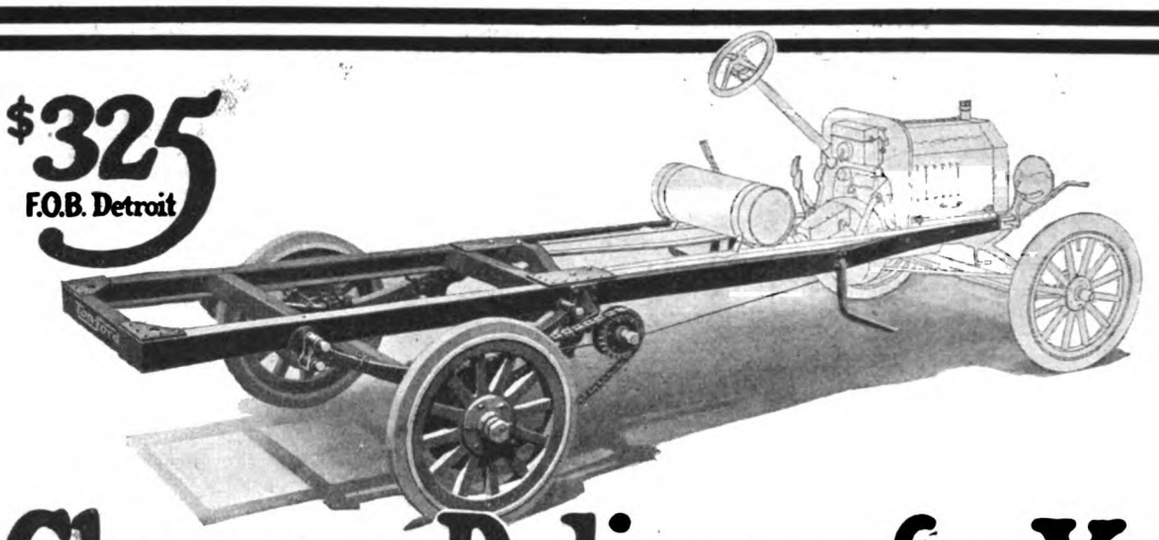
Syracuse Manufacturers of **New York**

Differentials and Bevel Drive Gears for Automobiles

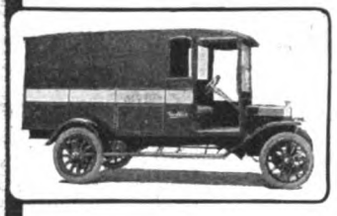
Picture Below
From the Southwest—
Showing Heat Treating Department in the Foreground



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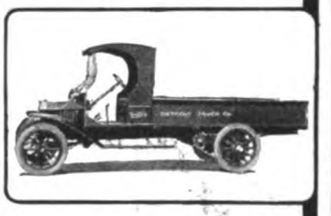


Cheaper Delivery for You



Tonford

TRADE MARK



THE Tonford is making a wonderful stir in business circles all over the country. Wherever a delivery car or one-ton truck is being considered in any line of business the Tonford is being considered. Sales are growing by leaps and bounds.

The amazing economy and flexibility of the Tonford is simply turning upside down all the old ideas of what a one-ton truck can do and be. People *know* what a Tonford can do—they know now what it is doing. What you want is a one-ton truck that will carry the load without shirking—a truck that you can always count on working—365 days a year if you want it. A truck anyone can understand and operate. That's what you get in the Tonford.

SETS A NEW MARK IN TRUCK EFFICIENCY

This Tonford unit—made in Detroit—and a Ford chassis will give you a dependable one-ton truck that will do anything any one-ton truck can do—do it more cheaply, more efficiently.

There is practically no work to attaching the Tonford. There is no welding and no cutting—simply four holes to drill. And there is no alteration to the Ford chassis. You can change it back to a pleasure car if you want to at any time.

BUILT TO CARRY AN OVERLOAD

The Tonford stands up because it is built to stand up. There isn't a bit of guesswork or theory about it. It is built to resist the hard pounding of bad roads. The frame is heavier—the axles are stronger and larger, the bearings are larger, and every detail is better than you will find in any similar device. It is built to protect YOU against overload.

SIMPLE CONTROL—EASILY OPERATED

YOU KNOW the easy handling, the flexible control, the economy and the amazing strength of the Ford. All these features are retained. Its simplicity, its accessibility and all-round practicability are all features of the Tonford.

MAKE YOUR DELIVERIES PROFITABLE

Hundreds and thousands of merchants, manufacturers, contractors, farmers and business men in all lines are beginning to realize that the Tonford means cheaper and more profitable deliveries.

Writs us at once. Get all the latest information. We KNOW what the Tonford will do for you—let us tell you. Write.

GET YOUR TONFORD NOW

Don't wait. We are making big shipments daily. Our production is constantly increasing. Order your Tonford at once—and you will get it quickly.

BACKED BY BIG AUTOMOBILE MEN

The Detroit Truck Company includes some of the ablest and best known men in the automobile industry. It is capitalized at $200,000. It is now producing Tonford Units at a rate it has taken others years to reach.

DEALERS—SOME TERRITORY STILL OPEN

One dealer took on the Tonford as an experiment. Now he says it's his "bread and butter." There are opportunities everywhere. Write at once.

DETROIT TRUCK COMPANY, Detroit, Mich.

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COVERT

Trebling the Production of Covert Transmissions

The constantly increasing recognition of the merit of Covert Transmissions has made it necessary to treble the capacity of the Covert Plant.

Below is shown an illustration of the enlarged plant at Lockport, N. Y.

More and more are prominent automobile and truck engineers specifying Covert Transmissions because they are right in design, material and performance.

This is the result of many years of the hardest kind of service under almost every conceivable condition. It is proof unquestionable that if you wish to be assured of an absolutely satisfactory transmission in your car or truck you may have it if you specify Covert Transmissions.

Covert Transmissions are made in a full line of types and sizes.

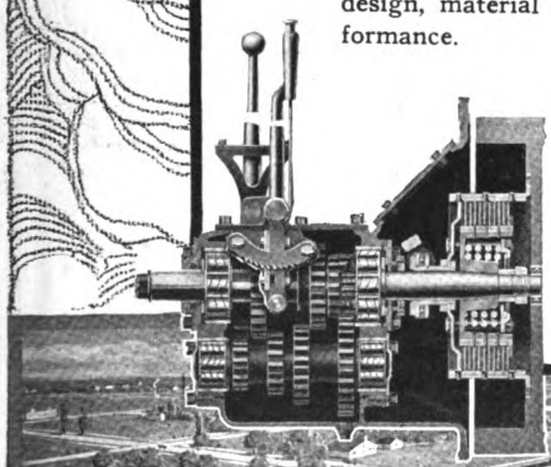
Let our Engineering Department help you solve your transmission problems.

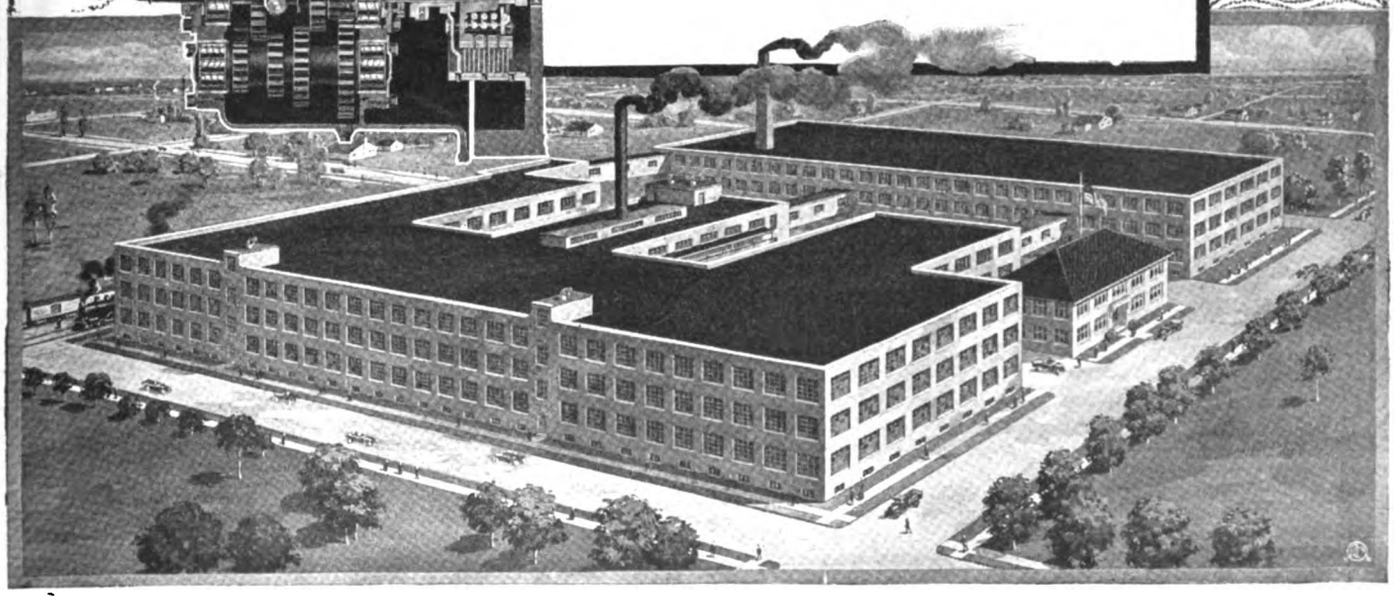
The Covert Gear Company

Incorporated

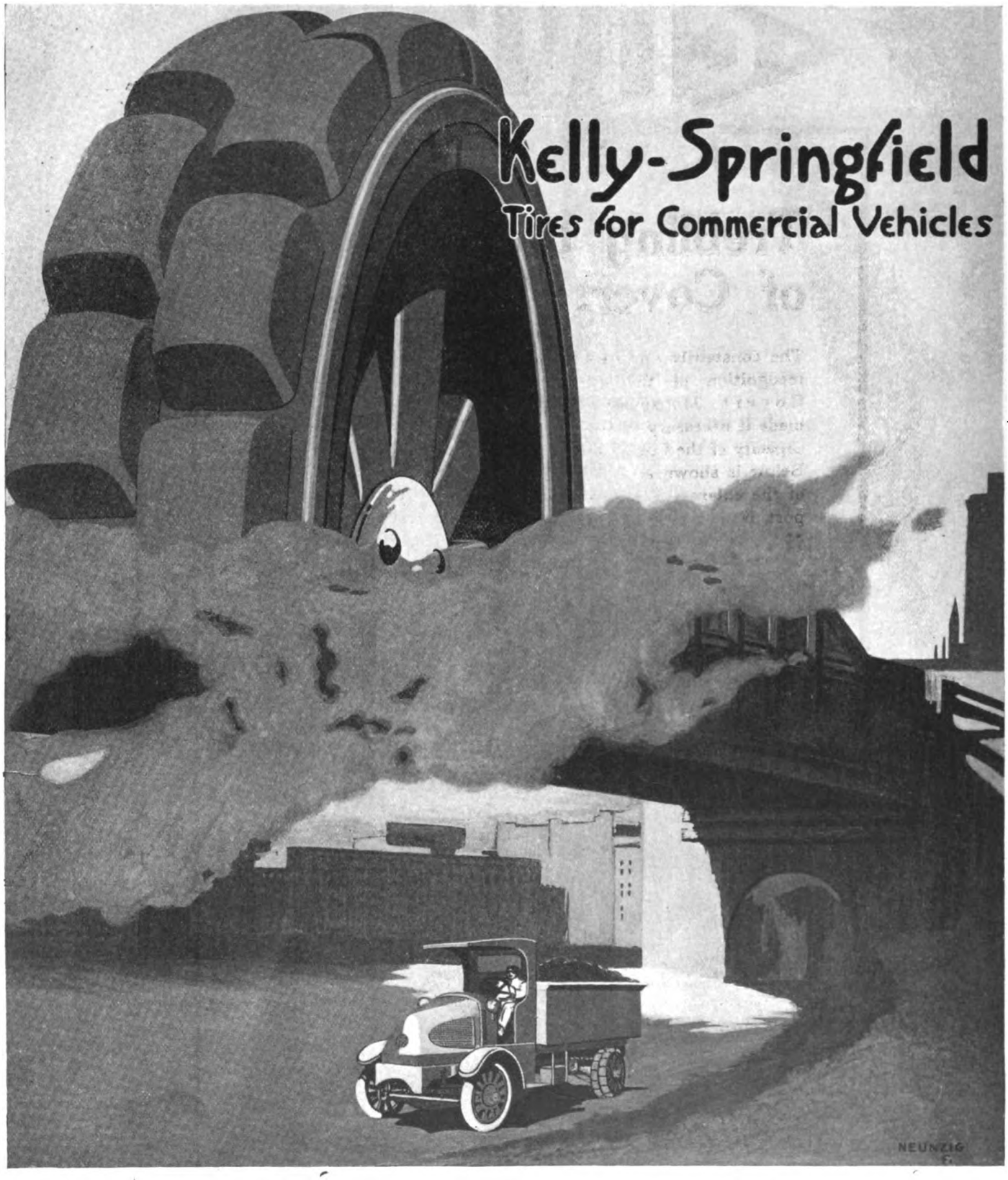
Sales Office
Detroit, Mich.

Factory
Lockport, N. Y.





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On the job—always

The reason Signal Motor Trucks are "on the job"—always—is that they are designed and built for that purpose by men who know how to design and build for that purpose.

It is one thing to **say** you build your trucks that way; another thing to build them that way.

It is because we build Signal Trucks to "stay on the job" that we use such high quality constructional units as Continental Motors, Timken-David Brown Worm Drive rear axles, Brown-Lipe Transmissions, Ross Steering Gears, Eisemann Magnetos, etc.

Is is because we use such positively high grade construction that we are not afraid to say exactly what we mean.

It is possible to build cheaper trucks but it isn't possible to build any better trucks.

Moreover, what we say applies with equal force to our one-ton jobs and our five-ton jobs—and all the sizes in between.

Signal sales are growing. Signal reputation is spreading. Everybody says the Signal has the cleanest mechanism of any truck made. That fact helps the sales as much as it helps the service.

Dealers who are interested in both Sales and Service—and owners who are interested in Service more than Sales, find the clean-cut Signal chassis equally attractive.

Write for literature.

SIGNAL

Motor Truck Co.

DETROIT, MICHIGAN

SIGNAL 1-1½-2-3½-5 TON

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Resiliency with Toughness



THE combination of extreme resiliency with long-wearing toughness in truck tire compounds is distinctively a Firestone success. It accounts for the most-miles-per-dollar service of Firestone tires and, what is equally important, the protection of motors, axles and frames by the elimination of shock and vibration. The fact that more Firestone truck tires are in use than any other make evidences the general knowledge and experience of truck owners as to Firestone quality. The Pressed-On tire here shown is one of the many Firestone types, which include a tire for every need.

It is the work of a few minutes at your local Firestone Service Station to press on to any S. A. E. standard wheel one of these strong, durable tires. They are applied direct to felloe band under heavy hydraulic pressure. "Creeping" is not possible. Call a Firestone traffic expert from your local station for details—and low prices.

Firestone Tire and Rubber Co.
"America's Largest Exclusive Tire and Rim Makers"
Home Office and Factory: Akron, Ohio
Branches and Dealers Everywhere

C. P. Seidel

Firestone
TRUCK TIRES

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THE MAKING of a BESSEMER TRUCK

The component parts of Bessemer Trucks are conceded by the engineers of the commercial vehicle industry to be the product of the leaders in this industry. From radiator to tail light we use only the product of the *acknowledged* leaders.

Our skill in assembly has come from years of experience. Our engineers and machinists work together and under the careful supervision of trained experts and cautious inspectors we produce a line of trucks that will show better results in comparative tests than any other vehicles of equal capacities.

The man who employs motor vehicles in his delivery service whether he be contractor or merchant, will get better results. effect greater economies and have more dependable transportation facilities with our trucks than with any other in the United States.

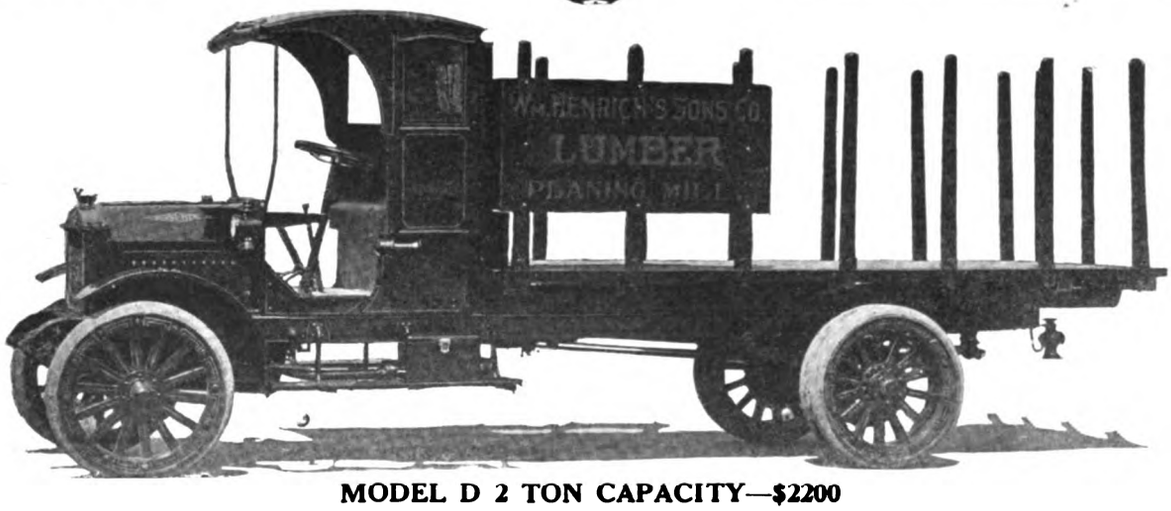
We Stand Ready to Prove This

Your request for information will bring you the indisputable evidence of the truth of our claims.

One-Ton—Internal Gear Shaft Drive—$995
Two-Ton—Worm Drive—$2200
Three-and-One-Half-Ton—Worm Drive—$3100

DEALERS—Write us NOW for our liberal selling plans. We give interested factory co-operation and enterprising aid to our dealers.

All inquiries regarding territory in New England, Eastern New York, Eastern Pennsylvania, New Jersey, Delaware, Maryland, Virginia and District of Columbia should be addressed to our Eastern distributors:



MODEL D 2 TON CAPACITY—$2200

BESSEMER MOTOR TRUCK CORPORATION

Lexington Avenue and East 42nd Street NEW YORK CITY

All other inquiries to

BESSEMER MOTOR TRUCK COMPANY, Grove City, Pa.

PLEASE MENTION THE COMMERCIAL VEHICLE WHEN WRITING TO ADVERTISERS

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PLEASE MENTION THE COMMERCIAL VEHICLE WHEN WRITING TO ADVERTISERS

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DIAMOND T MOTOR CAR CO
DIAMOND
CHICAGO. ILL. U.S.A.

In the Markets of the World DIAMOND T Trucks Are Pushing Horse Drawn Vehicles into the Discard—Extending Trade Boundaries and Bringing Smiles to the Cash Registers of Thousands of Business Houses.

Send for full Details

DIAMOMD T MOTOR CAR COMPANY
CHICAGO ILLINOIS

DISTRIBUTORS:

Diamond T Motor Truck Co. of New York, 245 W. 55th St., New York City.
E. B. Olmsted, Buffalo, N. Y.
Pittsburg Saxon Co., Pittsburgh, Pa.
John H. Ryan, 495 Broadway, Milwaukee, Wis.
Brown Camp Hardware Co., Des Moines, Iowa.
Hudson Phillips Co., St. Louis, Mo.



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U. S.

BALL BEARINGS

Only Quality Bearings

Particular stress is laid upon the fact that in the new and modern U. S. Ball Bearing plant, shown below, only bearings of quality are produced.

In manufacturing organizations of any kind, or type, where both quality products and cheap products are produced, there is always danger of cheap labor, or cheap material, or cheap methods occasionally becoming mixed with the quality products.

To safeguard against such contingency, the U. S. Ball Bearing Manufacturing Company confines its efforts entirely to the highest quality bearings possible of manufacture.

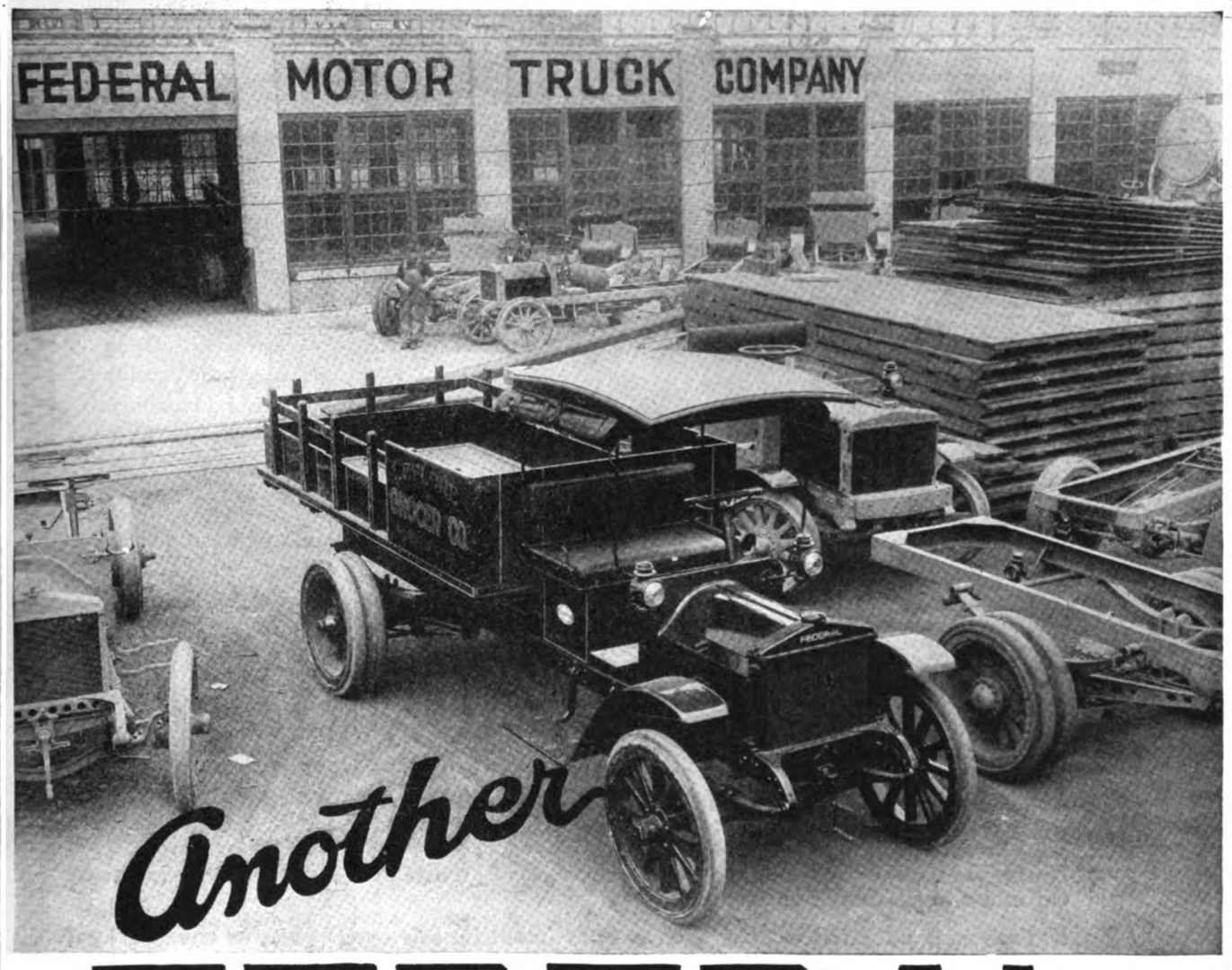
U. S. Ball Bearing Manufacturing Co.

(Conrad Patent Licensee)

Palmer St. and Kolmar Avenue, Chicago

Interior view shows one corner of the race grinding rooms.

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FEDERAL

"Another Federal" comes out of the big Federal Factory every few minutes—for your customers—another haulage problem solved—another business speeded up.

"Another Federal" has been the frequent word from so many dealers in the past six years since the first Federal was made that the Federal output has increased 126 per cent yearly.

"Another Federal" is the continual order of so many firms that 60 per cent of all Federal sales are repeat orders.

One Federal sells "Another."

Federalize your territory—write us for the new "Blue Book of Traffic" which illustrates Federal Haulage in nearly every line of business.

Federal Motor Truck Company

Detroit, Michigan

1½, 2 and 3½ Ton Worm Drive Motor Trucks

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The Laborer is Worthy of His Hire

IN July, 1912, **four years ago,** in the city of Seattle, I conceived the idea of building an attachment to convert pleasure cars into one-ton trucks.

The first attachment was completed on the 14th of March, 1913, **three and a half years ago.** It was built to use with the Ford chassis. I called it "Form-a-Truck." It found instant favor with the public, and during the succeeding two years I continued building and selling one or two at a time.

The demand for the "Form-a-Truck" became so great, that a year ago the Smith Form-a-Truck Co. was organized. Chicago was selected as the manufacturing and selling center. All my personal rights were transferred to the new company and additional patent rights acquired.

The capacity of the first factory was outgrown in ninety days. A new factory was built having a capacity of 300 complete jobs per day. A duplicate of this factory is in the process of construction.

Eighteen hundred dealers — all over the country—contracted for twelve million dollars' worth of Smith Form-a-Truck attachments in the first four months of the new company.

An appropriation of $242,000 was made for advertising during 1916 to help dealers, and more than $100,000 has already been spent.

A strong financial, production and distribution organization was built up.

And all that was done—not merely promised—in less than one year.

* * *

Did anybody hear, three and a half years ago, of an attachment to convert a pleasure car into a chain-driven one-ton truck?

Did anybody advertise or offer such an attachment for sale even as late as one year ago?

* * *

During the past six months a number of competitors have appeared—principally former employees or business connections—attracted by the extent to which the business of The Smith Form-a-Truck Company has grown within a short time, but ignorant of the toil, the effort, the money and the hundred various problems that had to be met to bring about our present condition of prosperity.

Although we knew that our patents would be infringed upon, we felt that the field was large enough for everybody, and had no intention of interfering with competition.

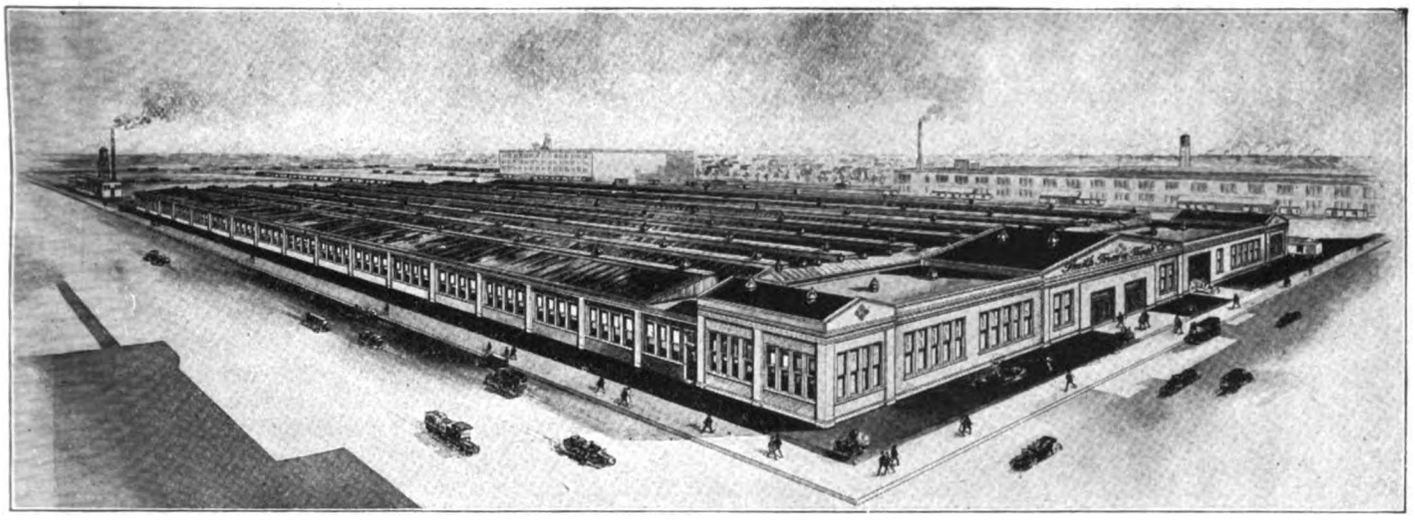
In their efforts to sell stock and incidentally attachments, our competitors have made deceptive statements about this Company—but even that was overlooked.

* * *

There are times when the gentle use of the hickory rod is more effective than patient forbearance. When competitors commenced to appropriate our trade name and good will, threaten our dealers, customers and salesmen, the Legal Department was ordered to fire—and it had plenty of ammunition.

The first suit was filed against the Simplex Truckform Company. On the 27th day of June the Court rendered a decision in favor of the Smith Form-a-Truck Company and ordered the defendant to pay costs.

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Smith Form-a-Truck Factory at Chicago

The following number of suits in patent causes are now actually pending against competitors, their dealers and customers:

Four in the Federal Court for the Northern District of Illinois
Two in the Federal Court for the Northern District of Georgia
Three in the Federal Court for the Northern District of Ohio
Two in the Federal Court for the Northern District of Wisconsin
One in the Federal Court for the Eastern District of Michigan
Two in the Federal Court for the District of New Jersey
One in the Federal Court for the District of Nebraska
One in the Federal Court for the District of Kansas
Four in the Federal Court for the Northern District of California
One in the Circuit Court of Cook County, Illinois
One in the Superior Court of New York County, New York
One in the Federal Court for the District of Dallas

It is not the intention of this Company to force any competitor out of business or to make any demands other than fairness, and until that is assured additional suits will be filed as rapidly as necessary.

This Company owes a three-fold duty:

1. To protect its own financial interests.
2. To protect the dealer, customer and salesman against intimidation.
3. To protect the industry from being demoralized—for the good of competitors as well as our own good.

There is room for everybody, and every laborer is worthy of his own hire. Taking advantage of another man's labor is intolerable in fair business.

This Company is in a position to make immediate deliveries of all orders. Its Sales Department is fully and effectively equipped to help the dealer make sales. Its financial resources are in excess of any possible demand.

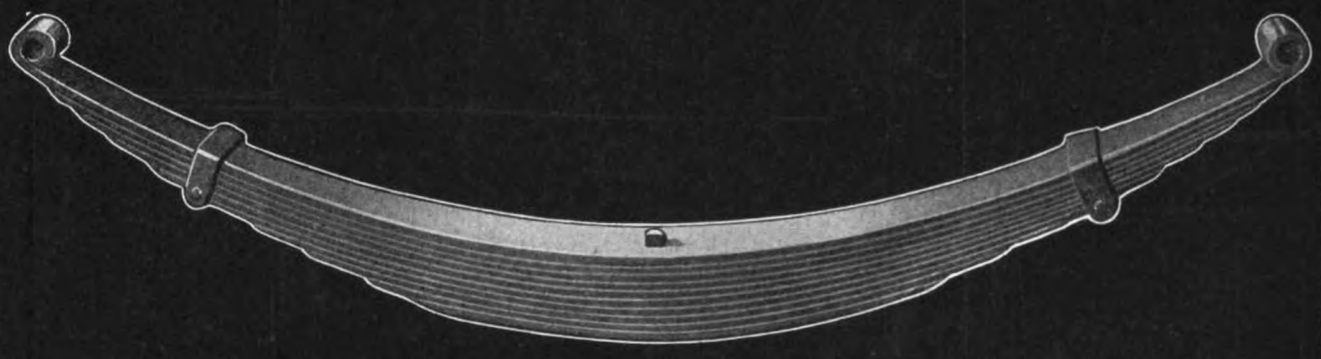
New lines—that will make it possible for all permanent Smith Form-a-Truck agencies to coin profits—are now being completed and will shortly be announced, territory will then be at a premium.

Smith Form-a-Truck Company
1470 Michigan Avenue, Chicago, Ill.

A. D. Smith
PRESIDENT

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"The Spring Is the Thing"



MATHER

Scientifically Heat-Treated

SPRINGS

designed to insure

Maximum of Elasticity and Endurance

with

Minimum of Vibration

Genuine made only by

The Mather Spring Company

Toledo, Ohio

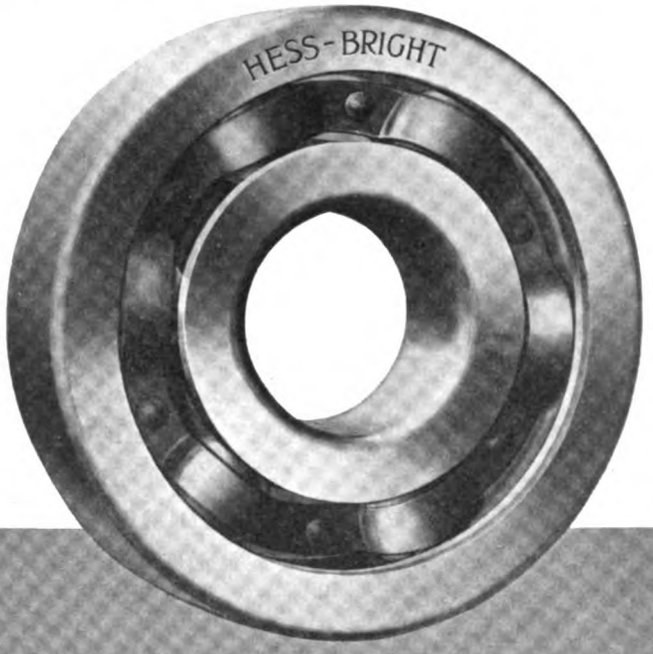
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HESS-BRIGHT BALL BEARINGS

First cost, when viewed in the light of long and faithful service, becomes a small matter.

HESS-BRIGHT

"The Inimitable Bearing," costs more than some others—but adds *quality* to the truck in which it is used.

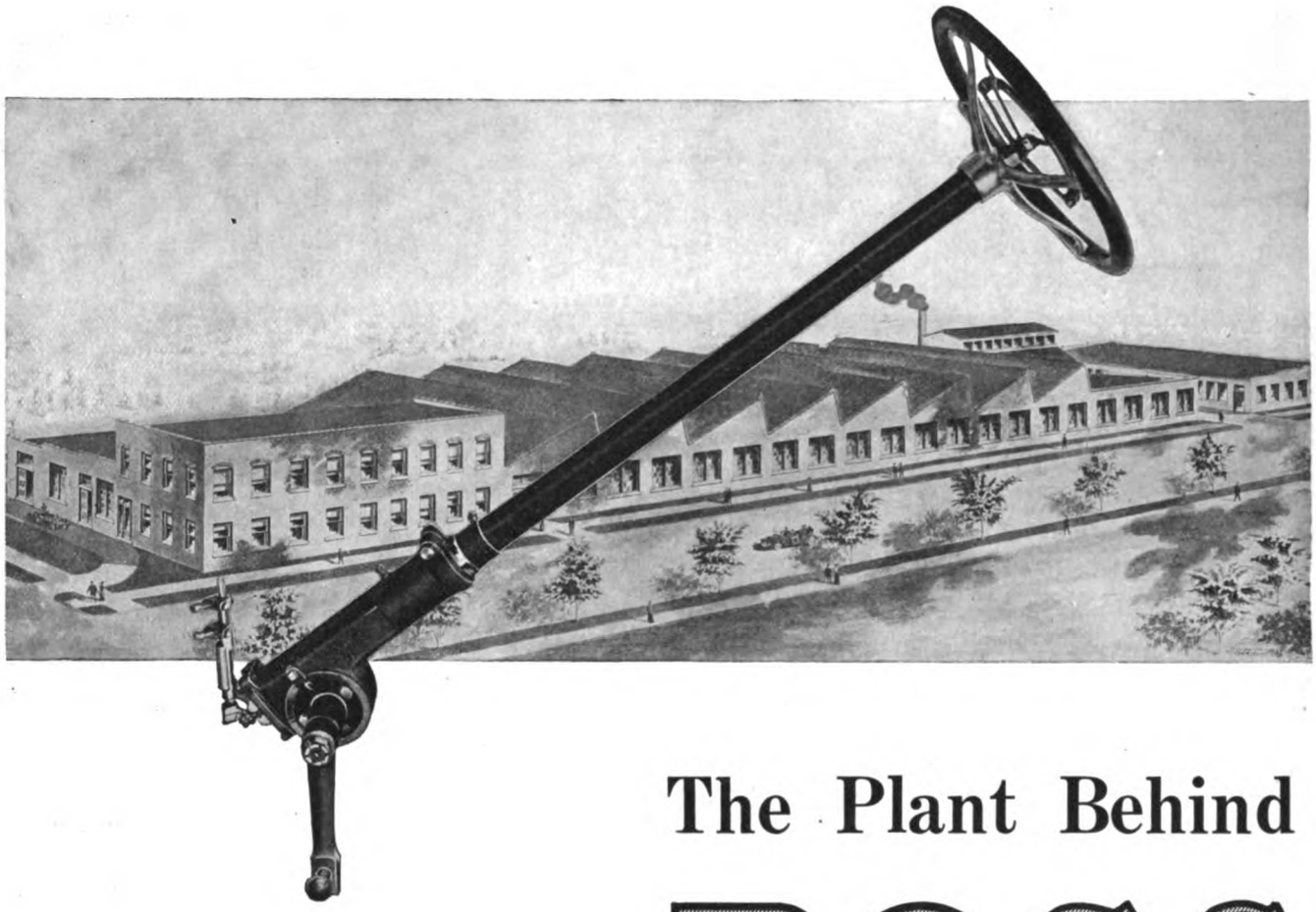


THE HESS-BRIGHT MANUFACTURING CO.

PHILADELPHIA, PA.

HESS-BRIGHT'S CONRAD PATENTS ARE THOROUGHLY ADJUDICATED

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The Plant Behind

ROSS GEARS

"the steering gears which predominate on motor trucks," is the last word in modern construction. Its superlative equipment aids us in affording our customers a service unsurpassed for prompt deliveries.

Ross Gear & Tool Co.

750 Heath Street LaFayette, Ind.

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The COMMERCIAL VEHICLE
Read by Business Men

Published on the first and 15th of every month
Entered as second-class matter, September 13, 1906, at the Post Office, New York, N. Y., under Act of Congress, March 3, 1879

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The Commercial Vehicle, Inc.

239 west Thirty-ninth street
New York City

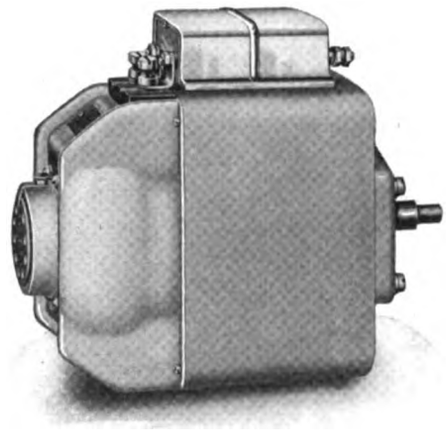
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Note Compactness of Dynamo

Gray & Davis

Starting Lighting System

For Trucks

GRAY & DAVIS units are rectangular in design in order to permit snug mounting close to the center line of engine.

The system meets the exacting **truck service** requirements.

With no need to drive fast for charging, the dynamo delivers uniform current at all speeds and conserves the battery.

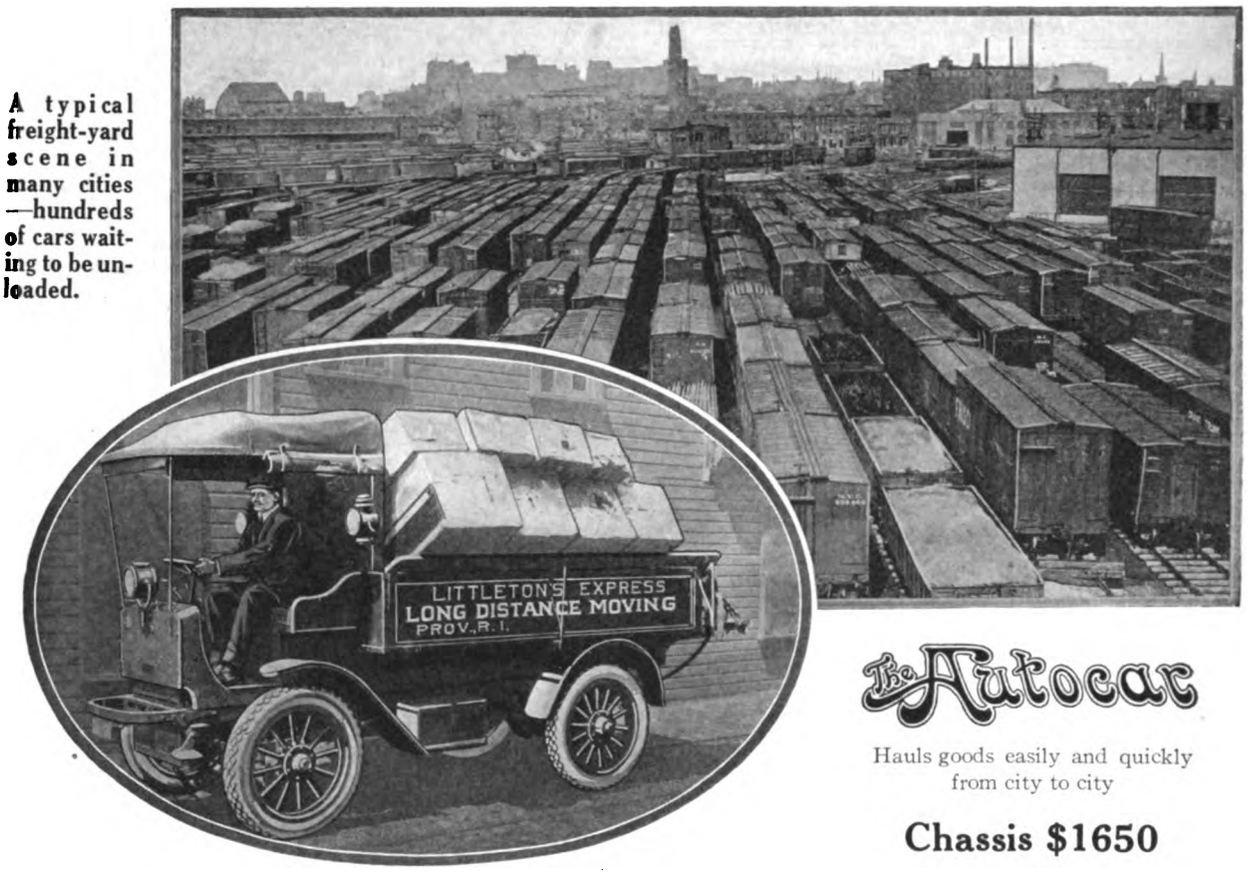
Instant starting facilitates prompt delivery—increases usefulness of truck and economizes cost for gasoline. Ideal running conditions remain permanent when vehicle is equipped with the Gray & Davis system.

GRAY & DAVIS, Inc.
BOSTON MASS.

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Many Houses Have Overcome Freight Congestion

A typical freight-yard scene in many cities—hundreds of cars waiting to be unloaded.



The Autocar

Hauls goods easily and quickly from city to city

Chassis $1650

IN NORMAL times, more than 4000 American business houses find the Autocar the most efficient and economical delivery vehicle. Now, when freight congestion is so acute, hundreds of concerns are using Autocars to carry goods from city to city.

The Nassau Smelting and Refining Company, of W. 29th Street, New York City, say:

"The freight congestion has been a serious handicap to us, but we have found a remedy. Recently it became necessary to send a consignment of material from our factory to a city 60 miles away. It was shipped by freight, and after being three weeks on the road was not yet delivered. The concern to which we shipped called us up and said it was absolutely necessary to have the material at once. We hired a motor truck, loaded some of the material wanted on it, and had it in our customers hands that afternoon. We then consulted the Autocar Company with reference to their trucks and placed an order with them."

Parteymueller & Gloekler, manufacturers of showcases and store fixtures, 3-5 Laight Street, New York City, say:

"A few weeks ago we were fitting up a large drug store in Germantown, Philadelphia, 90 miles distant. Showcases and fixtures were shipped by rail. When they arrived much of the glass was broken. It became necessary to send 4000 pounds of glass over immediately. The workmen were waiting for the material. Freight under present conditions would have probably taken weeks. We loaded the glass on our Autocar at 5 o'clock in the morning and it arrived in Philadelphia at the place of our contract early in the afternoon. The car was back in New York that night, ready for business the next morning."

Write for Autocar Catalog and list of users

THE AUTOCAR COMPANY, ARDMORE, PA.

Motor Delivery Car Specialists Established 1897

Sales and Service Plants

New York	Chicago	Philadelphia	Boston	Baltimore
Newark	Providence	Los Angeles	Washington, D. C.	Atlantic City

Represented by Dealers at other points

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The Commercial Vehicle
Read by Business Men
Vol. XV September 1, 1916 No. 3



One of the five large railroad stations in Buenos Aires showing extra wide well-paved streets, furnishing ideal conditions for motor truck traffic. The five depots are located in different parts of the city and around all five are very wide well-kept streets. Around freight depots are the same wide roadways

Opportunity Beckons the American Motor Truck In South America's Large Expanses

Part III

Motor Truck Market of Buenos Aires Lies Dormant Despite Ideal Conditions, Great Need and Ability to Purchase

By David Beecroft

BUENOS AIRES, June 30—Of all markets for trucks built in the United States, none in South America offers the promise of Buenos Aires, the largest, most modern and progressive city of Latin America.

To-day 97 per cent of all cartage in this city is done by horses, leaving only 3 per cent done by motor trucks. There is no special reason for the scarcity of motor delivery vehicles here, further than that the market has not been developed as systematically as it should have been. The feeling is general that trucks are going to come here and come fast. There is a good field for light U. S. A. vehicles, as well as a good field for heavy-capacity vehicles.

Wonderful Promise in Buenos Aires

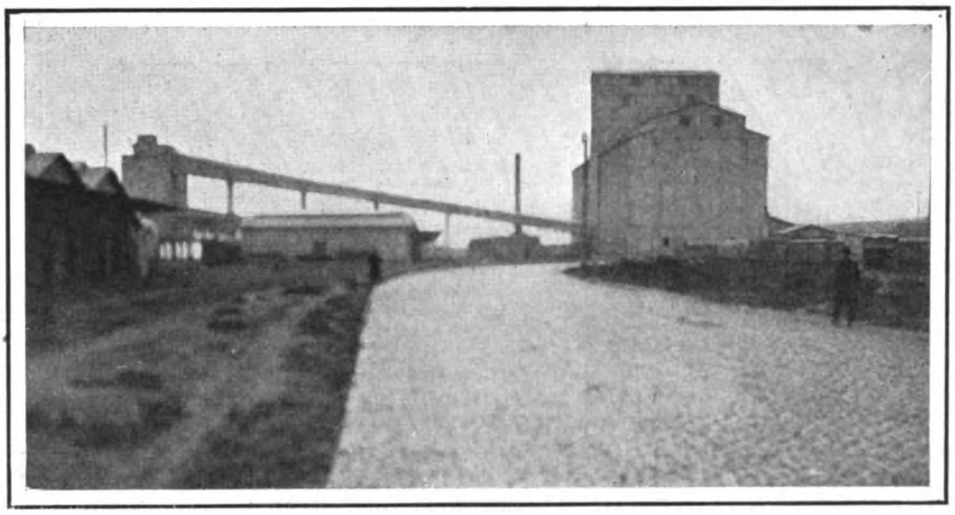
In order to get a definite, yet very conservative, estimate of the possibilities of selling motor trucks here, I made a canvass of the business firms here with Manager Titus of the National City Bank of New York City. This bank has only been opened a couple of years, but in that time has risen to sixth place in deposits in a field of twenty older institutions. To facilitate U. S. A. firms doing business here the bank has a very extensive credit and commercial department and is the best source of information in this country.



The tandem two-horse cart will soon be ruled off the streets of Buenos Aires. Already they are attempting to legislate the trailer trolley out and discussing various ordinances that have to do with reducing traffic congestion

Our ultra-conservative canvass of the firms, having regard for the volume of their business as well as their financial standing, showed 800 firms that should be owners of motor transportation. Some of these are very large concerns and others would be in the market for perhaps one or two small-capacity delivery vehicles. This estimate could be doubled if we were to add those firms whose

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This is a wide stone paved street in Rosario, Arg., a city of 400,000, located 6 hours by train from Buenos Aires. Rosario is a much greater grain shipping center than Buenos Aires, in fact, the finest farming land is located around Rosario. There are miles of this stone-paved street along the docks. The building shown is a large grain warehouse, one of the few of this type seen in the Argentine. All parts of the city are connected with this well-paved street along the water front. Water fronts on all cities along the east coast of South America are very modern so far as street pavements, street areas and loading devices are concerned

financial capital warrants them buying trucks. We could add very materially to it by including those firms who solely on volume of business should have motor delivery systems.

800 Waiting Prospects

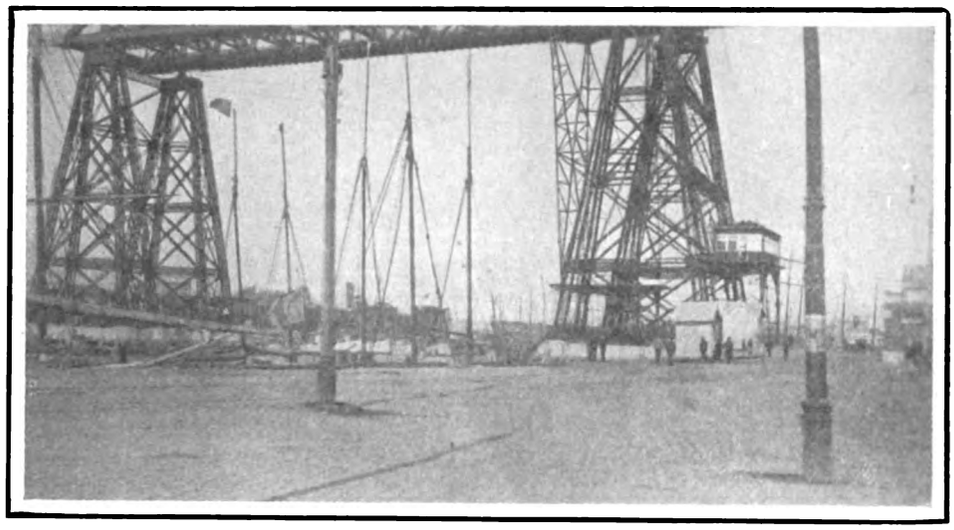
These 800 firms are made up of the usual array of business houses to be found in any city with a population ranging from 1,500,000 to 1,800,000. For example, in the suburb of Quilmes, 20 miles out of the city, is the celebrated Quilmes brewery, one of the largest and most scientifically-conducted and managed breweries in the world. It is using some motor trucks to-day, but should be using many more. It is just that distance from the city that motor trucks could be used to advantage for direct delivery from the brewery to the retailer. In addition, there are two other large breweries, but they are not in the same classification as Quilmes as regards size or progressive methods of management.

There are five or six large furniture houses that have large retail houses and large factories. There is the question of delivery from the factories to the retail house and thence to the consumers.

In Buenos Aires are seven or eight large wholesale grocers and perhaps thirty others of smaller caliber. The city, with its huge area, is peculiarly adapted for the motor truck in this service. The grocer requires daily deliveries from the wholesaler.

You can find ten large concerns in the textile trade here, and over forty smaller ones. These are largely wholesalers with not only large deliveries to retailers all through the city, but much transportation from the depots to their warehouses and then again to the depots for country distribution.

Shoe manufacturing is a growing industry here and already there are four or five factories that manufacture 1000 to 1500 pairs per day, all of which are either delivered direct to the retailer or to the railroad depots.



This is a conveyor bridge crossing a small river which enters Buenos Aires harbor at one end. There is much traffic over this bridge, which explains its peculiar design. With the steel tower at the right end is the conveyor or bridge part which carries the vehicles. It is suspended from overhead by steel construction which travels from side to side of the river on the overhead cross framework. Only a matter of seconds are needed to make a trip across. Very frequent trips are made. The system of traffic is rather the help-out kind and not the block system, where all travel is stopped for too long a period



A very wide street in the City of Cordoba, Argentina. Cordoba, a city of 140,000, is in the interior of the country, a little north of the center. It is a night's train trip from Buenos Aires. This city has many other streets as wide as this one, and while it also has many narrow streets, the movement of using wider ones is growing. This street is typical of many seen in the central cities of Argentina.

There are two very large tobacco concerns that are as heavy advertisers as any in U. S. A. Both of these have started in with motor trucks and lighter delivery vehicles and will be in the market for more.

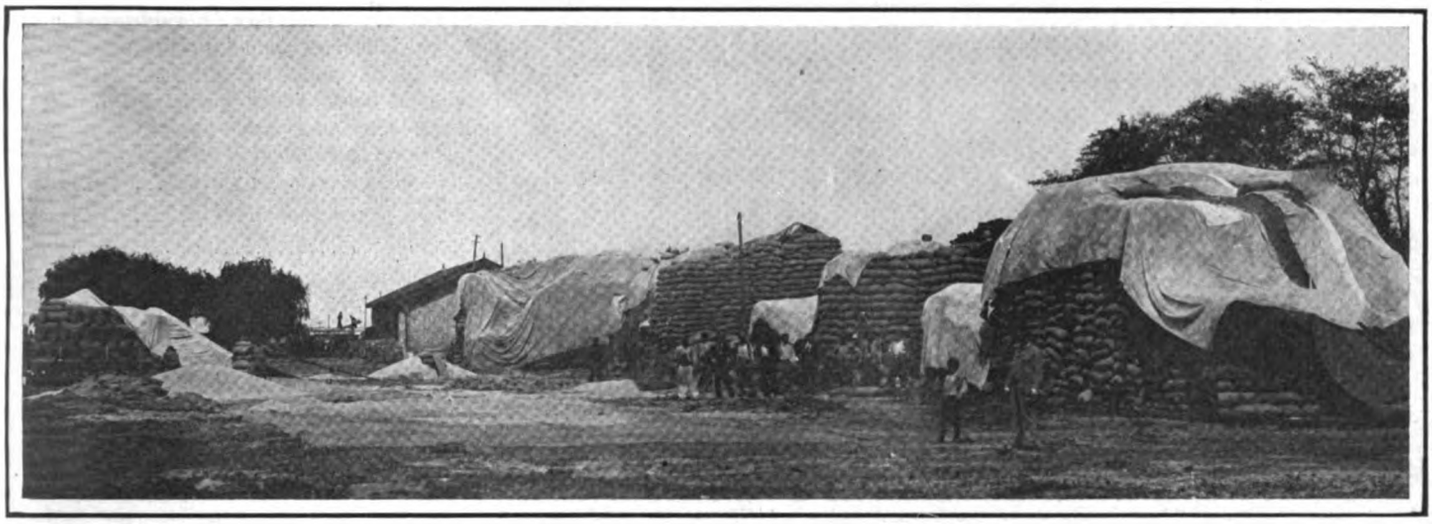
In our canvass we counted five large firms in the wholesale hardware business and twenty other smaller ones who are prospects for motor transportation of one kind or another.

You can count on six large wholesale drug houses.

Add to this list seven or eight firms in the lumber trade and five large concerns who specialize in building construction materials.

There are here five large daily newspapers, two of which rank as the finest

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This is a grain picture from an Argentine farm. The grain is piled in sacks awaiting to be transported to the railway depot. Frequently 40 to 50 per cent of the grain is lost before it ever reaches the depot. This picture shows one of the bad farming conditions in the country and one which the U. S. A. motor truck can do much to improve. The large farmers have much need for trucks. The scene is only one of a hundred that can be seen on any of the large farms or estancias. Already some of these farmers or estancieros are using motor trucks. Thousands of them should be using them

daily papers in the world and will compare in size, make-up and general news value with our own *New York Times*, the *Chicago Tribune* or the *Kansas City Star*. One of the smaller papers is already using some Studebaker vehicles. This field is just opening. Great city areas and wide connecting streets are ideal for rapid delivery service.

Newspapers, Paper, Department Stores

Buenos Aires, as well as other South American cities, has a large field for medium-capacity vehicles in the caterer trade. Here they are called *confiterias*. They want 800-lb. vehicles for quick delivery of pastry, etc. There are from fifteen to twenty who should use such vehicles and many others that are in the market. Several inquiries were made for a light type vehicle for this trade.

Here there are six large concerns in the wholesale paper trade, concerns who receive their stocks from U. S. A. or Europe and who have to deliver it to the consumers as well as reship much to other interior cities.

Buenos Aires has eight good department stores, one of which, as we stated in our first article, has recently added thirty Studebakers to its delivery equipment. This is only a starter. Harrod's, a branch of London's big store, uses motor delivery very largely. Practically all of the department stores will change from existing horse to motor systems just as they are doing in our U. S. A. cities.

To this list you can add seven large candy manufacturing concerns, twenty printing houses, match factories, fruit jobbers, five or six large clothing makers, two tanneries, and scores of other industries.

Packing Houses Need Motorizing

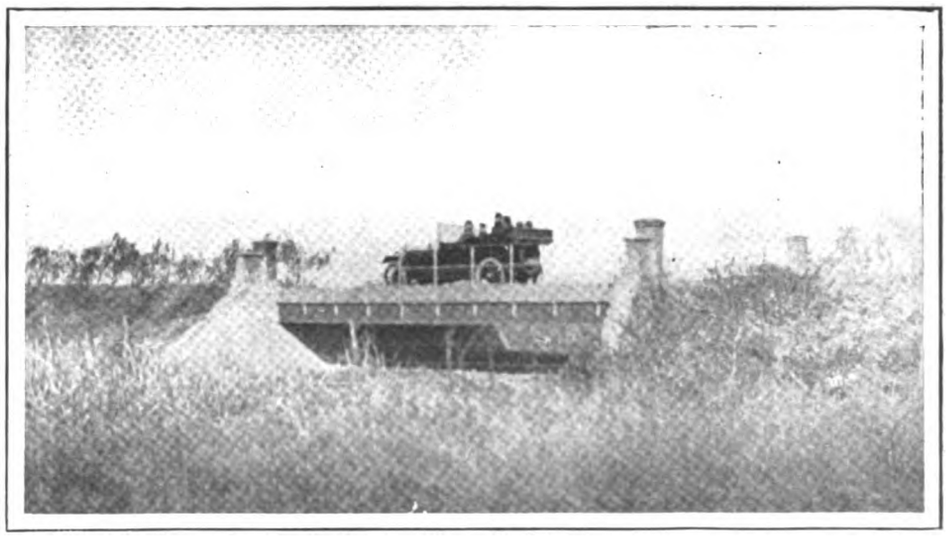
One of the largest fields for motor truck use in Buenos Aires is the local meat-slaughtering trade for the city. A large percentage of the meat is slaughtered at the *mataderos*, which are on the outskirts of the city.

According to the city ordinances, the meat slaughtered in the morning at the *mataderos* must be delivered to all of the retail butchers in the city by 11 a. m. At present, 220 to 250 carts are used in this service. They are generally all two-horse, four-wheel types, of 4-ton capacity. These carts are owned by different concerns, but there is a large cartage organization that exercises a control over them. The thought is that all of these can be displaced by motor vehicles. Complaints are rife regarding the lack of proper sanitation in the old horse vehicles, particularly in the hot summer months of December, January and February. There is now talk of erecting new slaughtering houses which would be the last word in sanitation, and if such were installed the motor vehicles would be certain to supersede the horse. Even if the new *mataderos* are not built for a few years there is going to be a change in the delivery system and a few motor vehicles are sure to get into use.

An apparent handicap with this trade at present is that the delivery work starts at 5 a. m. and is over at 11, leaving the vehicles idle the remainder of the day unless they could be installed in some other service. It is possible on very careful investigation to overcome this obstacle.

100 Trucks = 250 Horse Wagons

While 220 to 250 horse wagons are used at present, it would be possible to handle the wholesale meat delivery with approximately 100 motor trucks of 3- or 4-ton capacity, or with a proportionate number of other units, in accordance with their capacity. At this time there



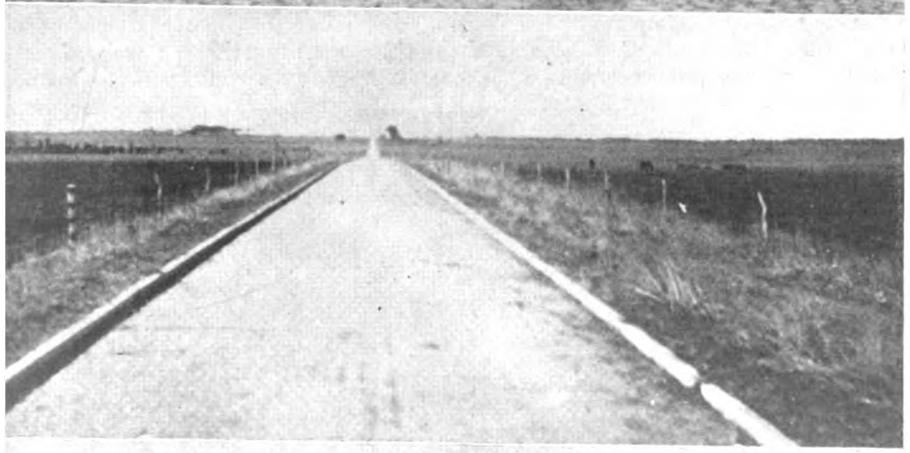
Typical cement and steel bridge on the new stone road between the City of Buenos Aires and the City of La Plata. At La Plata are two large meat packing industries, Armour's and Swift's. Much meat for local delivery in Buenos Aires can be and will be transported over this roadway. La Plata is a good shipping port and the motor truck business between this port and Buenos Aires is bound to increase

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Section of bad road showing horse team stalled at the right. These roads are most in need of grading machines. Already several U. S. A. road-making machinery houses have started their propaganda in the Argentine and we hope the road-making machine will soon be in greater vogue

Showing the good substantial stone foundation for the stone road between Buenos Aires and La Plata. This shows a stretch of the road in the outskirts of Buenos Aires which was held up owing to certain railroads not wanting to permit its crossing their lines. The entire road was held up in several places for months at a time for similar reasons

A good stone road near warehouses at Rosario. These roads are not cobble stones, but rather square stone blocks, many of which have been imported from Norway and other European countries

Typical view of the long straight stone road between Buenos Aires and La Plata. This road is for miles straight as an arrow and nearly as level as a billiard table. In the distance is a slight hollow, which is characteristic of the Argentine landscape. The road is 35 feet wide, has a very smooth surface and fine cement curbs at each side. There are fine bridges wherever needed, in fact, there is not any road in the U. S. A. that can be compared with it

Another view of the Buenos Aires-La Plata stone road showing where it is joined by a virgin dirt road on the right side. Unfortunately Argentina has poor roads, and that at the right is typical of 99 per cent of the country. This is no bar to motor trucks, because the motor truck and the motor car will bring about an era of good roads just as in the U. S. A.

are 310 tons of meat slaughtered and to be delivered each day. This delivery has to be made all over the city, the longest hauls being perhaps 25 miles. Figures for an average day of slaughtering show as follows:

1,200 cattle, dressing	1,200 lb.....	480,000 lb.
1,500 sheep, dressing	40 lb.....	60,000 lb.
800 swine, dressing	100 lb.....	80,000 lb.
Total		620,000 lb.

Allowing for one truck load a day, it would require 103 trucks of 3-ton capacity to handle this work. If each truck makes two trips, it will require over fifty machines to do this work.

But this is only a part of the meat slaughtering trade in Buenos Aires. There are several large slaughter-houses in the outskirts of the city and the Armour and Swift slaughter-houses at La Plata, 65 miles out. One of the packing-houses in the outskirts of this city has 200 horse carts, which are largely used for delivery to the butchers, many of them preferring to purchase from a private packing concern as compared with buying at the municipal slaughter-house.

U. S. Packers Buying

Armour is contemplating installing a motor bus line from La Plata to Buenos Aires to handle all of the sales to butchers. At present the meat has to be sent by train and it will prove much cheaper to handle it by motor truck. Heretofore it has not been possible to ship any by motor truck from La Plata, as there was no road, but within the last month the new government stone-block road has been practically completed, excepting the La Plata end, and once it is done there will be the finest road in South America for motor truck use. It is level as a table and nearly as straight as an arrow for many miles. The surface is smooth, as the stone blocks are well shaped.

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Armour is already using a couple of Studebaker delivery trucks in retail work and is already saving over 40 per cent over its previous horse delivery system. An economy of $1,000 in May, as compared with April, was accomplished.

Postal Work a Field

There is a bright possibility of the post office in this city using motor trucks in great quantities; the department already has a few and has learned of their efficiency. There are in all forty-five motor vehicles in this work and ninety-seven horse vehicles.

The city is divided into thirty-four sections for the purpose of mail collection and delivery, of which eighteen sections are connected with the central post office and sixteen with branch post offices. Three of the sections working direct from the post office are now using motor delivery and collection vehicles. The other fifteen sections in this service use one-horse vehicles of 1200-lb. load capacity. All of the sixteen sections serving branch post offices use horse vehicles. Nine collections are made each day, at 45-min. intervals, there being twenty mail boxes in each section.

The postal service to and from the railroad stations is important, as at present there are 125 train departures per day and 120 train arrivals. All of these carry mail service. In the railroad service are used five motor vehicles, made up of two trucks of 6600-lb. load capacity and three delivery vehicles of 1750-lb. load capacity each.

In addition to this motor equipment there are twenty horse vehicles, made up of ten carts with two horses each, load 5000 lb.; there are two one-horse wagons of 3300-lb. load, three closed two-horse wagons, 3300-lb., and five light carts used to carry special letters to trains at the last minute before departure.

Parcel Post Work

Buenos Aires has a parcel post system in which it used eight closed carts that make two deliveries per day. Each cart carries approximately 370 parcels per day.

In addition, the post office offers other uses for the motor truck, namely, in the interchange of mail bags between the main and branch offices. This is done on a fixed schedule by motor. There are three main routes for this work and nine trips made over each per day. This is done by motor car, one of 1700-lb. capacity serving, and requiring 1 hr. per trip.

When mail steamboats arrive there is always a very heavy mail, which is handled by three motor trucks of 3-ton capacity.

The post office estimates the cost per month of a motor vehicle at approximately $150. Gasoline alone costs $60, oil $10, and tires $75.



This map of South America shows in the shaded sections that part of the country best adapted for motor truck sales and it is largely to this section that our articles refer. Around Sao Paulo, Brazil, is the coffee industry which certainly requires motor trucks. The soil in this state is red, like New Jersey, and while there are not good roads today there is no reason that there will not be in a few years. The country is all rolling, and is as pretty as Iowa or Pennsylvania. The state has over 700,000,000 coffee trees, and these are divided among the very estates that have every need for motor trucks

All of Argentina is a big possible field for trucks among the wealthy farmers. Already they are realizing the value of trucks on these huge estates which may be from 10 to 50 miles in length and have scores of small farmers on them. The owners of these farms are sufficiently wealthy to have not only one, but several trucks. They own the finest motor cars which they use in the cities and should own trucks. We are selling them U. S. A. motor cars which they are starting to use on the farms

Uruguay is a small country with a population of but 1,300,000 but it has over 24,000 large and fairly-wealthy farmers, many of whom are in the market for trucks

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Hearse in Buenos Aires. The Latin-Americans are fond of showy ceremonies for the deceased, and motor trucks for that field will naturally have to share this spirit. There are plenty of good body builders in Buenos Aires and other cities to fit substantial hearse bodies to motor chassis

The cost of maintaining each of the 223 horses used is $9 per month, U. S. gold, or $20 per month Argentine paper.

Rural Mail Delivery

In the interior of the country are some sections where motor trucks are at present used in mail service. These are in the provinces of Neuquen and Mendoza, in the south and west, where railroad lines are scarce. There are other lines in Cordoba and Salta.

The high price of gasoline is heard on every hand in Buenos Aires as a reason why the truck market is dead. This may apply to large-capacity vehicles but it should not apply to light delivery trucks such as a score or more of makes in the U. S. A. The facts are that the motor truck and the motor delivery business has never been properly pushed in Buenos Aires. Small delivery jobs can be sold here in great quantities just as in any other city.

In South America Rio de Janeiro has always had a great reputation of being a good truck town because it is so hot. The weather kills horses. Buenos Aires is not a cool town in the summer months of December, January and February. It is a little hotter than St. Louis or Kansas City. As such it should be a good truck town.

Buenos Aires' real right to be a great motor delivery center is due to the great area it covers. The city with 1,800,000 population is no small place, but when one remembers that it is located on a flat *pampas* and that great distances are its major characteristic, one sees why motor trucks should be used.

U. S. A. motor trucks are not strongly represented in Buenos Aires, in fact, it would be fairer to say that they are scarcely represented at all. One dealer has a varied line of our trucks including Pierce-Arrow, Stewart, Atterbury and Gramm-Bernstein. He has so many that the representation of any does not receive that consideration which it merits. As a result none is very well handled.

This dealer rents certain of the vehicles. He rents a Pierce-Arrow street sprinkling truck at $1400 Argentine paper per month. This equals $616 U. S. gold. He rents Stewart 1500-pound delivery wagons at $800 paper or $352 U. S. gold per month.

Often one finds Buenos Aires agents for some of our best lines not doing anything, not even pushing the goods. One of our best known makes of trucks is sold by a dealer who has been in receivership for some time. He has over $15,000 U. S. gold worth of these jobs on his floor and has not moved any of them for years. He is apparently waiting until the war is over, when he hopes to sell some.

Studebaker has been particularly active in pushing the sale of delivery trucks and the Studebaker vehicle is becoming more or less of a usual sight around the city. The sale of thirty to Gath & Chaves' department store is naturally a big advertisement, in fact, the biggest boost that our motor delivery vehicles have received in all of South America.

The meat packing industries are going to be big users of medium-capacity vehicles within the next few years. Better sanitation in connection with meat delivery is imperative, and any concern invading the Argentine field should make a close estimate of this field. The army will take up the truck and the advertisement our trucks have received in Europe will make it easier to do business in Argentine.

Foreign Truck Trade Opportunities

Trucks to Run on Railroad Tracks are wanted in a South American country, according to the report of a commercial attaché of the United States Department of Commerce in the country in question. The railway company desiring the trucks has asked for bids on supplying eight of the vehicles. Further information may be secured from the main office of the Bureau of Foreign and Domestic Commerce, Washington, D. C., or from any of its branches in the principal cities throughout the country by referring to Foreign Trade Opportunity No. 21693, as published in the Commerce Reports for July 1, 1916.

Opportunities For the Sale of Motor Trucks in Croatia, near Austria-Hungary, are expected to be good after the close of the war. During the year preceding the outbreak of the war, 434 passenger cars and fifty-four motor trucks were sold within the jurisdiction of the Croatian territorial government, which includes all of Croatia and Slavonia. The motor trucks used are chiefly from 3 to 5 tons capacity and the price ranges from $4,800 to $5,200. The Chamber of Commerce of Zagreb, one of the principal cities of Croatia, estimates that more than 2000 of the inhabitants are worth over $50,000 each. The name of a dealer who could represent American trucks in that country and who is recommended by the Zagreb Chamber of Commerce may be obtained from the Bureau of Foreign and Domestic Commerce, Washington, D. C., or from any other of its district offices throughout the United States. Refer to file No. 76625.



This is a line-up of four-wheeled wagons at the municipal slaughter houses of Buenos Aires. There are from 220 to 250 of these wagons used for delivering meat to the local butchers. This meat must all be delivered before 11 a. m. There is a movement on foot to have this complete system of delivery supplanted by motor vehicles. Improved sanitation is one of the strong arguments for the motor vehicles

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City Comforts for Artist-Ranchman on Wyoming Plains



Artist's touring truck, showing storage boxes on running board, water tank under seat with drain cock, side doors and canvas cots



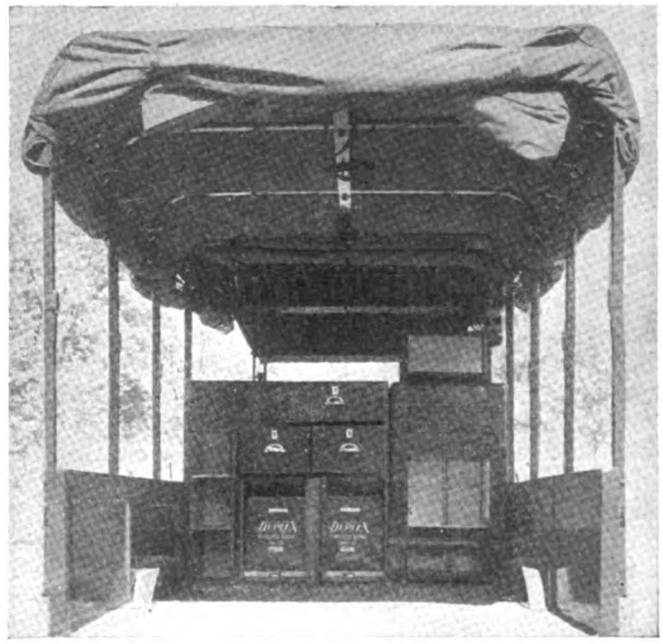
Three-quarter rear view revealing hinged tailboard with step, large fuel tank in rear and prairie schooner type of canvas top

PRACTICAL-MINDEDNESS and artistic genius are happily blended in the case of A. A. Anderson, a painter of note residing not far from Times Square, New York City. Mr. Anderson is also the owner of a ranch in Wyoming, to which he annually repairs. Having tried many means of conveyance, he has finally settled upon the motor truck as the most all-round, practical vehicle for his needs. On his trip to Palette Ranch this year Mr. Anderson takes with him every comfort of home, and in his touring and camping in search of scenery for sketch-book and canvas his transportation worries will be at an end.

A 1½-ton truck has been especially constructed for him by the Hurlburt Motor Truck Co., New York City. It is equipped with an electric-lighting outfit supplied by a storage battery and engine-driven generator, water tanks, extra fuel tanks, a stove, a refrigerator, food boxes, and drawers and lockers for the accommodation of provisions and their preparation and for his personal kit. Hammock beds are arranged to be set up within the capacious body, affording comfortable sleeping quarters.

The reason for Mr. Anderson's selection of a truck in preference to a touring car is that he anticipates much very rough going and that no touring car could possibly give the storage capacity and sleeping room which are provided on the Hurlburt vehicle.

To afford riding comfort comparable to that of a touring car, special springs have been fitted and the seat has been comfortably upholstered and made wide enough for four persons. The vehicle has been geared for a speed of 25 miles per hour, and because of the nature of the mountain roads to be negotiated specially wide tires have been fitted, single, both fore and aft.



Rear view of Palette Ranch truck, showing cooking kit, refrigerator, drawers and cabinets. Note hooks along sides of top and electric light bulbs on ridge-pole

The floor of the body is set low, wheel-housings permitting clearance for the wheels. The top is supported by stout wooden bows and covered with a loose tarpaulin, which when stretched out forms a capacious tent over the whole vehicle.

It is entered either from the rear, where the tailboard folds down to form a step, or at the sides, where there are doors.

In case the owner wishes to take a bulky kit along for a stay of some duration, the body offers a large clear space for this purpose.

Sufficient water and fuel are carried in the capacious tanks to serve for a long tour.

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An Emergency Reliance

IF the railroads and the brotherhoods agree to disagree and this country is plunged into the commercial misfortune of a national railroad strike, unquestionably great damage will be done all lines of business, for transportation is truly the life of business. But all business need not stop because one particular agency of transportation ceases activity. Twenty, 10, even 5 years ago such a strike as is threatened would have been much more disastrous than it would be to-day.

To-day there are upwards of 200,000 motor trucks in use in this country. In a pinch this could be increased at the rate of 10,000 a month. Most of these vehicles are used in freight work complementary to rail transportation or in delivery which is wholly unrelated to railway shipping. Their total tonnage capacity may be placed at 3,000,000 tons daily, at the very conservative estimate of 15 tons per truck daily. The total tonnage of all the railroads in 1914 was 2,000,000,000 short tons, or 6,667,000 tons daily. This would mean that our tonnage of transportation would have to be about one-third what it would be with the railroads running, disregarding mileage entirely.

Here, though, is a greater obstacle, since the average rail haul ranges about 150 miles, while the maximum average truck haul that could be expected at the above estimate of 15 tons per day would be 5 miles. Thus we see that the motor truck equipment of this country is capable of doing approximately one-ninetieth of the freight work now done by the railroads, if they totally abandoned all other pursuits.

Such a strike, if called, could not be of long duration. Sufficient reserves of sustenance and the materials of industry are on hand in most centers to prevent absolute disaster. A certain amount of privation would be suffered, but the absolute necessities of life could be supplied by the service of motor trucks. It has been stated that New York City would be in a state of famine 8 days after the cessation of railway traffic; but New York is exceptional in this respect, being located remote from the sources of supply and being possessed of the greatest population of any city in the world. Other cities, such, for example, as Chicago, Philadelphia, Cleveland, Detroit, Pittsburgh, Kansas City, etc., could hold out much longer.

In times of flood and blizzards such as have isolated some of our cities from all sorts of normal transportation or communication, motor trucks have repeatedly been the saviors of the situation. The most notable example of this was the Dayton flood in April, 1913, where about 100 trucks kept the city alive for more than a week in addition to a vast amount of salvage and sanitary work caused by the devastating waters. Practically the same experience was had by Cleveland and other cities in November, 1913, when the great storm paralyzed all rail and horse traffic for 4 days.

What can be done spasmodically in isolated instances can be done universally should emergency demand it. Passenger transportation will be easy, except in severe winter weather, by motor car and as long as we have motor trucks no freight tie-up should be sufficient to leave our cities without milk, coal and food.

Standard Truck Controls

NEVER in a long life of illustrious endeavor has the Society of Automobile Engineers done more creditable work than the standardizing of controls on commercial vehicles which the Standards Committee has just completed.

Safety demanded it to avoid accident through confusion of operations by drivers whose habits of action gained from one make of truck did not fit the controls of another.

Convenience obviously required uniformity in the placing and action of the levers.

Operating efficiency suffered through its lack in many cases.

And finally production economy decreed that useless variation in this detail of design should be eliminated. Parts makers will find it easier to cater to the demands of assemblers who adopt standard controls than to those of builders each of whom has his pet theory of how such and such a function should be controlled. Truck builders will have less difficulty in getting standard parts on short notice.

All of these points have been clearly recognized all along, but it remained for that watch-dog of efficiency, the S. A. E., to bring matters to the happy climax.

No one can doubt that the new standards will have the heartiest support of every progressive member of the industry.

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Taylor's Organizing Genius Keeps Guns Fed

RAISED almost from a boy with the steering wheel of a motor vehicle in his hands, Arthur G. Taylor, garage superintendent for the E. W. Bliss Co., Brooklyn, N. Y., has been able to organize and whip into shape a large fleet of eighteen trucks in less than 1 year's time by his knowledge of motor vehicles and by untiring efforts which often necessitated more than 18 hr. work a day. The organization of that large truck fleet and its personnel into a smooth-working transportation equipment in less than a year is a feat worthy of considerable credit, more so when it is considered that the Bliss company had never owned trucks before.

War Forced Motorization

One of the oldest manufacturers of special machinery in the east and long famed for the production of torpedoes for the United States navy, the Bliss company had previously used horses exclusively until soon after the outbreak of the present war abroad, at which time it received large orders for the manufacture of munitions for foreign consumption. Faced with the problem of turning out more munitions than ever before and the necessity of building and equipping additional shops in order to proceed with the work under a heavy penalty if not finished on time, the company soon found that horses were much too slow. They delayed the construction of the shops and the delivery of the munitions from one shop to another for different operations because of their small mileage ability and the street congestion caused at the points of loading and unloading.

Fleet Grew Swiftly

Accordingly, the Bliss company first bought a 5-ton truck, then six 2-tonners for carrying small goods and later eleven more 5-tonners, one or two at a time as the work on the munition contracts progressed, so that they could be used efficiently. It was shortly after the purchase of the first truck that Taylor was engaged to take charge of the fleet, make each truck an efficient unit of the equipment as soon as it was bought and take upon his shoulders the responsibility of having all the trucks in such shape that they could be used whenever wanted. Though the truck work has slackened off somewhat at this writing from the highest peak in the curve, at one time practically all of the trucks worked 24 hr. a day for several months, using two shifts of drivers.

Even under these severe running conditions, it was Taylor's problem to make certain that all of the trucks were ready for any kind of work at any time and that competent drivers were always available to drive them. Besides, each truck was to form a well-oiled cog in the wheel of Bliss transportation upon which the carrying out of the munition contracts depended. Certain machine operations had to be performed at one plant, others at a different plant perhaps 3 or 4 miles away, and still others at the first plant after having been



attended to at the second. All this haulage had to be done by Taylor's trucks. If they fell down, the machines working on the munitions also fell down because of lack of material and this in turn would have caused serious time losses and perhaps financial ones, too.

But Taylor saw to it that the trucks did not fall down. He was formerly a passenger car chauffeur in Brooklyn, N. Y., where he was born in 1879, and accordingly knew the great need of employing competent drivers for his trucks. After Taylor had been driving for several years he then entered the selling end of the passenger car field; then re-organized a garage in Port Jefferson, L. I.; later sold lubricating oil for a large New York concern, and just before joining the forces of the Bliss company sold motor trucks in the southern territory for a large manufacturer.

All of the experience gained in these various positions stood Taylor in good stead when he was confronted with the entire responsibility of organizing and operating an eighteen-truck fleet. His drivers were his first problem. One-quarter of his present drivers are former horse wagon drivers of the Bliss company.

Drivers Well Trained

Taylor has trained them to his own method of operating a truck. They did as they were told, not having had any preconceived notions of their own as the result of driving trucks for some other company. They know the routes and the class of work done by the Bliss company. These drivers, properly trained to take good care of their motor mounts, have proved of much aid to Taylor in forming the nucleus of an efficient corps of drivers. The other truck drivers were all hired on probation. Taylor told them how he wanted them to run his trucks. He made it his business to know whether they did what he told them or not. If not, they were discharged.

Personal Inspection

Taylor's long experience in the sale and operation of motor vehicles has enabled him to become an expert both in the maintenance and inspection of his trucks. His eye and his ear are attuned to the least little thing amiss with any of his trucks. He does not delegate the inspection of his vehicles to his boss mechanic, but goes over each truck every night after it has completed its allotted work. He has introduced a tag system for making repairs

(*Continued on page* 21)

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Seek Ideal Truck in Border Study

U. S. and S. A. E. to Prepare War Specifications

WASHINGTON, D. C., Aug. 26—Military transport experts believe efforts to develop a motor truck capable of meeting the needs of the army campaigning along the Texas border and in Mexico will cause the manufacture for commercial uses of an ideal truck within the next 2 or 3 years. The army transport board has been in session here recently, considering the preparation of specifications for each type of truck required by the army, upon which motor car makers will be invited to bid.

The board found that the tests to which the army trucks were subjected on the border and in Mexico were the most severe that had been had in any part of the world. The conditions of service were quite abnormal, yet the performance of some of the trucks was remarkably good. Experts of the S. A. E., acting on the suggestion of the board, now are on the Mexican border studying at first hand the unusual conditions of weather, sandy grit and alkali existing there with a view to the still further improvement of the army trucks.

EAGLE PASS, TEX., Aug. 21—Several members of the Society of Automobile Engineers have been spending some time recently at different border points for the purpose of making a personal investigation of the practical operation of motor trucks. It is stated that the severe service to which these transportation vehicles have been put has enabled the engineers to discover points of weakness in their construction and design that were not brought to light in their work of meeting the more ordinary requirements. Important improvements will be made to motor trucks that are manufactured for army use in the future as a result of the research which expert engineers have been making upon the border. No public announcement has as yet been made of the nature of these amended specifications, but it is stated that they will be of a nature to increase the durability of the trucks.

NEW PEERLESS WAR ORDER

NEW YORK CITY, Aug 18—One of the Allied governments has placed, through Gaston. Williams & Wigmore, an order for 2400 Peerless trucks. delivery to commence immediatelv. Delivery will be made at the rate of from 80 to 100 trucks a week until late in 1917.

FRENCH CARBURETERS FOR U. S. WAR TRUCKS

PARIS, FRANCE, Aug. 1—Dissatisfied with the gasoline consumption of many American trucks, the French army motor car authorities have decided to adopt a uniform type of French carbureter. For more than 6 months there have been complaints that gas consumption was too high. This was due, in many cases, as the American factory representatives in France were able to prove, to incorrect carbureter setting and poor driving. Nevertheless the authorities were of the opinion that considerable economies could be effected in the amount of gas consumed by army trucks.

One French carbureter manufacturer offered to replace the whole of the carbureters on American trucks with his instrument and accept as payment half the price of gasoline saved. This offer was not accepted, but the authorities ordered careful records to be made of mileage and consumption for every truck and convoy in army service. These statistics have been compiled over a period of several months, and are the most elaborate of any got together by any truck users.

The comparative diagrams show the gas consumption for a given period of all White, Packard, Velie, Jeffery, Kellv, Reo and Pierce-Arrow trucks. A feature of these diagrams is the wide divergence between trucks of a different make but a common load capacity. A more curious case is that for one of these makes the gas consumption of the 5-ton model is only a fraction higher than that of the 3-ton type.

When this data had been secured the authorities held a competition among French carbureter manufacturers. Three firms took part: Claudel, Zenith and Solex. The winner was Claudel, who was given the initial order to replace the carbureters on the Reos. Statistics showed that the 2-ton Reo was averaging 4.52 miles to the gallon. With the Claudel and other European carbureters the figures given out are 7.36 miles per gallon. Results with the 3½-ton Sterling were practically the same, the consumption being dropped from 51-52 liters to 31 liters. The Sterling is not used very extensively in the French army, and no army records have been made of its consumption, but there are more than 100 of them employed by the munition factories around Paris.

The first attempt to economize was made by Chief Engineer Michelat of the Delage factory, who cut his consumption 40 per cent. This example was followed by other users, until about sixty of these trucks have been converted to European carbureters. It is understood that Ferdinand Charron, who holds the agency for Sterlings in France, is supplying all trucks at the present time with Claudel carbureters.

Complaints of high gasoline consumption having been brought to the notice of the Pierce-Arrow engineers in France, it was decided to hold a comparative test in order to show that the high consumption was not due to any fault in the truck or the carbureter. Two of the factory representatives took ordinary trucks in army service, obtained the proper carbureter adjustment and took their place in a convoy driven by soldiers and commanded by an officer.

Coming Commercial Vehicle Events

Sept. 4-8.....Madison, Wis., National Tractor Demonstration.
Sept. 13.....New York City Annual Outing, Motor Truck Club of America, Inc.
Sept. 10-16.....Milwaukee, Wis., Second Annual Motor Show, Machinery Building.
Oct. 11-21.....
Oct. 20.....Cincinnati, Ohio, Good Roads Show, Music Hall.
1917
Jan. 13-20.....Montreal, Que., Can., Montreal Motor Show.
Feb.....Newark, N. J., Passenger Car and Motor Truck Show, First Regiment Armory.
Feb. 3-10.....Minneapolis, Minn., Tenth Annual Auto Show.

Truck Opportunity in R. R. Strike

This Magazine Opens a Free Register of Trucks

NEW YORK CITY, Aug. 30.—The threatened railroad strike offers the motor truck one of its greatest opportunities. If the strike succeeds in only partly paralyzing the railroad facilities, a national calamity can only be prevented by the wider use of motor trucks. The truck will have to do train service between cities and towns. The present opportunity is a big push in the direction of eventually supplanting the railroad for short-haul freight traffic.

To aid in locating and securing motor trucks available for this work, should the strike actually take place as planned at 7 a. m. on Sept. 4, THE COMMERCIAL VEHICLE has opened a REGISTER OF AVAILABLE TRUCKS. Manufacturers, dealers, agents and owners of trucks are invited to register such of their trucks as will be available for this work. There is no charge for the registration and information regarding available trucks registered in all cities will be furnished free.

CINCINNATI TRUCKS READY

CINCINNATI, OHIO, Aug. 24—In the event of a strike among railroad employees steps have been taken by city officials and commission merchants of Cincinnati to eliminate the hardships attending such strike as to the shortage of the food supply. It is planned to use motor trucks to haul the products of farmers and truck gardeners to the market. Dr. R. B. Blume, chief food inspector of the city, has been working among the farmers, with the result that he has secured their co-operation. Many of the farmers have pledged themselves to either buy or rent trucks to haul their products to the market. Others have combined for the purpose of buying or renting trucks to be used jointly by several. Milton A. Mailender of the Milk Exchange has planned to send motor trucks among the dairies to collect milk.

FULLER OUTPUT QUADRUPLED

KALAMAZOO, MICH., Aug. 18—The output of Fuller gearsets and clutches has increased four times in July, 1916, over what it was in July, 1915. The output of this single month was nearly equal to the entire output of 1914. The first 6 months of 1916 showed production one and one-third times greater than the entire year of 1915. Two and one-half times the number of men are employed as were in July, 1915.

HALF-SOLING PNEUMATIC TIRES

AKRON, OHIO, Aug. 18—The Adona tread, which is stitched to an old tire carcass much as new soles are sewed to old shoes, has been brought out by the Miller Rubber Co., Akron, Ohio. The new tread consists of a complete new tread containing fabric, cushion and breaker strip, and, unlike retread bands, can be applied to a tire which has been worn down until the daylight shows through, provided the side-walls and bead are in good shape. In fact, it is practically a complete new casing but without side-walls or beads. Although made with the Miller Geared-to-the-road tread, these treads may be applied to any other make of tire.

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U. S. Capital Increased to a Million

Raised from $300,000 as in 1914 Stock Offered Public

CINCINNATI, OHIO, Aug. 21—Increased from $300,000, the capital of the United States Motor Truck Co. is now $1,000,000. This increase was made at the annual meeting held here yesterday. The new stock is both preferred and common, the preferred being 7 per cent cumulative and participating, with the common up to 10 per cent. A part of the issue has been subscribed to by present stockholders and an additional block offered to the public.

Besides the regular 7 per cent dividend paid on deferred, the directors have placed an additional sum in surplus. The company was established 7 years ago, and in 1914 was reorganized with R. C. Stewart as president.

KOEHLER ABSORBS FACTOR

NEWARK, N. J., Aug. 25—The H. J. Koehler Motors Corp. has been formed here, with a paid-in capital of $425,000, to succeed the H. J. Koehler S. G. Co. and the L. E. Schlotterback Mfg. Co. The Schlotterback company was the factor for the Koehler company, which designed and sold the Koehler 1-ton truck. The combination is for the purpose of strengthening the organization for the purpose of increasing production.

H. J. Koehler remains the president of the new concern, and the product and its price, $895, are unchanged. Mr. Koehler formerly handled the Ford, E. M. F., Buick, Hupmobile and Grant, introducing each of these into the Eastern territory.

MACK AND WHITE STAR BECOME METROPOLITAN

NEW YORK CITY, Aug. 26—The Metropolitan Motors, Inc., has been established, with a capital of $1,000,000, to manufacture a light delivery vehicle and to take over the business of the White Star Motor & Engineering Co. W. C. Mack, one of the Mack brothers who started the Mack truck, is the moving spirit in the new venture, and it is said to be his survey of present market conditions that impelled the concern to undertake the production of a ½-tonner at a price which will be about $695.

The White Star trucks of 2, 3 and 5 tons capacity will be continued. The stock in the new concern is all common. Production is expected to start between Oct. 1 and 15.

DOBLE STEAMER IN DETROIT

DETROIT, Aug. 21—Abner Doble, expert on steam motor cars, and at one time consulting engineer for the Stanley Motor Carriage Co., maker of steam cars, has arranged to build a steamer in Detroit. He has associated with him C. L. Lewis, former president of the Consolidated Car Co., and M. J. Hammers, also connected with that organization. The General Engineering Co. has been organized, with a capital stock of $200,000, to market a car after Doble's designs and also to license others to manufacture a steam car. Mr. Lewis is president, Doble is vice-president and Hammers is secretary-treasurer.

Three cars of a new design are now being constructed by the General Engineering Co., and these are to have two 30-hp. two-cylinder uni-flow steam engines. Doble generates the steam in a generator under the hood, the heat being supplied by burning kerosene that has been previously vaporized. A hot point, electrically heated to red heat, ignites the vaporized kerosene and forms a fire under the steam generator almost instantly the fuel and electricity are turned on. This steam passes to the engine mounted on the rear axle. There is a condenser, and the lubricant is introduced through the water.

½-TON DENMO TRUCK PLANNED

CLEVELAND, OHIO, Aug. 21—The Denneen Motor Co., which has been marketing a 1¼-ton truck that sells at $1,385, contemplates bringing out another model of 1000 lb. capacity, to sell at $750 or $800.

BRINTON NOW IN PHILADELPHIA

PHILADELPHIA, PA., Aug. 18—The Chester County Motor Co., Coatesville, Pa., will move to Philadelphia, Pa., where its plant will be located at Cherry Street near Fifty-eighth Street. This company, of which J. E. Brinton is president, has been manufacturing a light gasoline commercial vehicle.

TIMKEN ABSORBS BROWN WORM

DETROIT, Aug. 21—The Timken-David Brown Co., this city, the majority of the stock in which was originally owned by the Timken-Detroit Axle Co., has been bought out entirely by the Timken-Detroit company, and the manufacturing operations will be consolidated under the management of the axle company. That portion of the Timken-David Brown stock which previously was not held by the Timken axle company was owned by David Brown & Sons, Huddersfield, England, and the new move divorces the two. The Timken-David Brown Co. always has been regarded as a part of the Timken factories here, being under the same roof. It manufactures worm gearing for motor trucks and power transmission, and the gear-generating machinery was brought over originally from Huddersfield.

BROWN TO MAKE FARR BOLT

SYRACUSE, N. Y., Aug. 19—H. G. Farr, Springfield, Mass., has licensed the Brown Co. of Syracuse to manufacture the Farr automatic lubricating spring bolt, which he has been developing for the past 3 years. It will be produced under an exclusive license under basic patents granted Mr. Farr and David Landau of New York City.

Although intended primarily for spring shackles, the bolt can also be used for other like duty where constant internal lubrication is required. It consists of a hollow bolt with drilled holes connecting the interior with the surface, in which a felt wick is inserted. This wick is the feed or reservoir wick, and is attached positively to the threaded cap in the head of the bolt. Smaller filter and feed wicks are pressed into the smaller holes. The bolt is filled with an oil gun and the wick is forced in, putting the oil under compression within the bolt.

Republic Plans Greater Future Output

Finances Strengthened By a $750,000 Stock Issue

NEW YORK CITY, Aug. 24—Conservative financing has been undertaken by the Republic Motor Truck Co., Alma, Mich., in offering $750,000 of 7 per cent cumulative preferred of $100 par through George H. Burr & Co. of New York.

Of an authorized capitalization of $1,000,000 preferred stock, $750,000 has been issued. None of the 62,500 shares of common which have been authorized has been issued, nor have they any par value.

The exceedingly sound financial condition of the Republic company is indicated by the fact that it has no bonded indebtedness, nor can it have any except by consent of three-fourths of the outstanding preferred stock. Similar referendum is required in order to increase the preferred beyond that already authorized.

The company was established in July, 1913, with a paid-in capital of $8,000. Its capital and surplus prior to the sale of this latest issue of preferred stock was $852,219.98, $269,300 of which represented cash contributed from time to time. Dividends of $198,717 have been paid.

The entire proceeds of this issue of stock will go into the treasury of the company to care for development of its business, the nature of which has been rumored but not officially made public. According to an audit by Price, Waterhouse & Co., the balance sheet as of June 30, 1916, with the addition of the new capital, will show tangible assets of over 210 per cent and net quick assets of more than 169 per cent of the preferred issue. The certificate of incorporation requires that the net quick assets must be at least 100 per cent of the outstanding preferred. No dividends can be paid on common until an amount equal to 4 years' dividends on the preferred stock shall have been accumulated from the earnings, this amount to be maintained.

Net earnings for the fiscal year ending June 30, 1916, according to Treasurer George W. Moore of the Republic company, were $530,593.66, or ten times the requirements for preferred stock dividends.

The company has 407 local agents, of whom 309 are exclusively devoted to the sale of Republic trucks. Forty-eight states are included in its territory. The production of Republic trucks has increased consistently since the establishment of the company. In the first 6 months of the concern's existence, from July 1, 1913, to Jan. 1, 1914, fifty-four trucks were sold. In the calendar year of 1914, 376 trucks were sold; in 1915, 1855; in the first 6 months of 1916, 2780. Since the beginning of the war 4837 trucks have been sold, of which but 212 were on war orders.

UNION BEARINGS SERVICE STATION

DETROIT, Aug. 21—The Bearings Service Co. has been organized here to handle the service for anti-friction bearings for all types of motor vehicles, and already has contracted with Timken, Hyatt and

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New Departure to conduct the service operations for these three large bearing manufacturers. The Bearings Service Co. in reality takes over the service operations of these three, and the idea is similar to that of the union railway station where competing lines enter a city.

NEW METROPOLITAN MOTOR MART

NEW YORK CITY, Aug. 25—Dealers in this city whose leases are about to expire, or who are having trouble finding storage facilities, will be interested to know that an eight-story building, serving the dual purpose of storage and service, is being planned. Interests identified with W. C. Durant are backing this. The building will provide close to 500,000 sq. ft. of floor space; and though it is backed by General Motors and Chevrolet interests, it will not in any sense of the word be a G. M. C. proposition, but will be open for all to avail themselves of its advantages.

This building will occupy the entire plot of ground on Eleventh Avenue from Fifty-fifth to Fifty-sixth Street, with a 200-ft. frontage on the avenue and on each street.

A modern fireproof building is to be erected of either steel and concrete or steel and brick construction. Though the plan now calls for an eight-story building, it is likely that four more stories will be added.

Special high-speed elevator facilities will be provided. It is planned to divide the 40,000 sq. ft. on each floor into eight units, each unit being designed to provide both storage and service facilities.

PARIS BUSES AGAIN RUNNING

PARIS, FRANCE, Aug. 25—The local motor bus service has been partially reestablished with a single route served by thirteen buses running on a 5-min. schedule. This service was withdrawn 22 months ago on account of the war. The newly established line is over the main boulevards from the Madeleine to the Bastille.

Interest attaches to these buses by reason of the good service they have performed in the war and the modifications which have been carried out on the new models as the result of war experience. It was an old-standing arrangement that in case of mobilization the whole of the motor buses of Paris should be equipped with special meat-carrying bodies or with lighter bodies for the transportation of troops. The parts necessary to modify the buses were kept in stock, so that within 48 hr. the Paris motor buses were transferred from civilian to war service.

WISCONSIN JITNEYS THRIVE

KENOSHA, WIS., Aug. 26—Jitney competition has been so successful in Kenosha that the street railway company reports that during the last fiscal year operating revenue has decreased 50 per cent and caused a loss of nearly $30,000 in earnings for the period. The street railways of Kenosha are operated by the Wisconsin Gas & Electric Co. They were formerly among the most profitable lines in the State, but are now said to be a losing proposition, the operating revenues being approximately $2,500 greater than revenues last year. In 1912 the cars carried 1,733,625 passengers. Last year they carried only 868,475. In 1912 the operating revenue was $91,534. Last year it was $44,160.

Electric Exposition to Show Trucks

Test Run and Model Garage to Be Special Features

NEW YORK CITY, Aug. 22—Electric vehicles, both of commercial and passenger types, will be exhibited, as usual, at the New York Electrical Exposition, Oct. 11 to 21, 1916. As before, the show will be held at the Grand Central Palace. Among the features of the show will be a test run of electric vehicles held during the show and an exhibit of a model garage by the New York Edison Co.'s electric garage at Central Park West and Sixty-second Street. G. V., Walker and Ward electric trucks will be exhibited.

OPEN CHARGING STATION IN MELBOURNE

MELBOURNE, AUSTRALIA, Aug. 16—The municipal electric supply department in this city will open a charging station for electric vehicles at its power house on Spencer Street. This station will be open day and night. The cost of current for charging will be 2 cents per unit between the hours of 10 p. m. and 8 a. m., and during other hours will be 3½ cents per unit. A charge of $2.43 per vehicle per week will be made for accommodation.

The absence of electric vehicles from the streets of Melbourne is largely due to the lack of charging stations, and the establishment of the above station will do much to create a demand for American electric vehicles of all kinds.

Maryland Tax Portends Dire Results

Excessive Fees Will Cost Both State and Cities Dear

BALTIMORE, MD., Sept. 1—So heavy are the charges imposed upon motor vehicles by an act of the last legislature, a large percentage may be forced out of service. Such result would mean a loss of considerable revenues to Baltimore and other municipalities, as well as to the State.

State Motor Vehicle Commissioner Baughman is in doubt regarding the operation of some of the provisions of the law imposing heavy licenses, and he has asked Attorney General Ritchie to give an opinion. Col. Baughman believes that the city will lose revenues which have been derived on motor vehicles with solid rubber tires. He bases his belief upon Section 133 of the new laws. This section says:

"The provisions of this sub-title are intended to be state-wide in their effect, and no city, county or other municipal subdivision shall have the right to make or enforce any local ordinance or regulation which shall change, alter or affect the speed limits prescribed by this sub-title, require any registration or licensing of motor vehicles or operators thereof in addition to the registration and licensing herein prescribed or impose upon the owner or operator of any motor vehicle any tax, registration fee, license fee, assessment or charge of any kind for the use of a motor vehicle upon any public highway or highways in this state."

The attorney general has sent to Col. Baughmam his opinion covering the question of drivers of vehicles which carry the United States mail. He states that Government employes must comply with all the laws of the State unless these laws in some manner interfere with or impair the service. He holds that chauffeurs must have the licenses whether or not the mail is carried under contract. It is held that the mail service would not be interfered with or impaired if the chauffeurs of the machines have licenses to operate.

Probably hundreds of jitney bus operators and owners will be unable to pay the money which will be required in the future under the new law covering passenger and freight carrying vehicles. But few thus far have taken out the licenses in Baltimore city, and these licenses are only for the last 6 months of the year. For this period one had to pay $120.32, while others paid in the neighborhood of $100. At this rate it is taken that many owners will be unable to meet the charges and will have to go out of business. The licenses referred to here are for jitneys.

In reaching the license charge for these vehicles it requires an expert mathematician. The number of trips made per day by the vehicle is multiplied by the mileage of each trip, multiplied by the number of days in the week the machines are operated, multiplied by the number of weeks in the year, multiplied by the number of passengers the vehicle is permitted to carry under the rules of the Public Service Commission, and then divided by a rate set out in the law, which is regulated by the weight of the vehicle.

HUB REPAIRS 85 CENTS PER HOUR

BOSTON, MASS., Aug. 21—It costs more now to repair motor trucks in Boston and vicinity as a result of a general increase in the price of labor at the service stations and garages. For a long time the average rate for labor on vehicles has been 75 cents an hour. A few weeks ago the various dealers found that the cost of materials and labor had been going up, so the rates were raised to 85 cents an hour. The Boston Commercial Vehicle Dealers' Association and the Boston Automobile Dealers Association held meetings to discuss the matter, but neither organization did anything as a body.

Some of the dealers thought they could get along at the old rate, and others felt that a raise was necessary. So it was decided to let the members make their own prices to meet their peculiar conditions. But there seemed such a prevalent feeling that more should be secured that shortly afterward signs began to appear in the service departments announcing that the price per hour for work upon vehicles was 85 cents. There has been no general complaint heard about it.

TRUCKS AT TWIN CITY SHOW

MINNEAPOLIS, MINN., Aug. 18—Motor trucks will be included in the exhibits at the Tenth Annual Minneapolis Auto Show to be held here Feb. 3 to 10, 1917. The show is held under the auspices of the Minneapolis Automobile Trade Association.

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3576 Trucks Used in Rhode Island

More Than One-Quarter Fords —Not Many Electrics

PROVIDENCE, R. I., Aug. 17—Registrations of motor trucks in this State up to July 1, 1916, show that 3576 trucks are in use, of which 3522 are gasoline-powered and fifty-four electrics. A tabulation by makes follows:

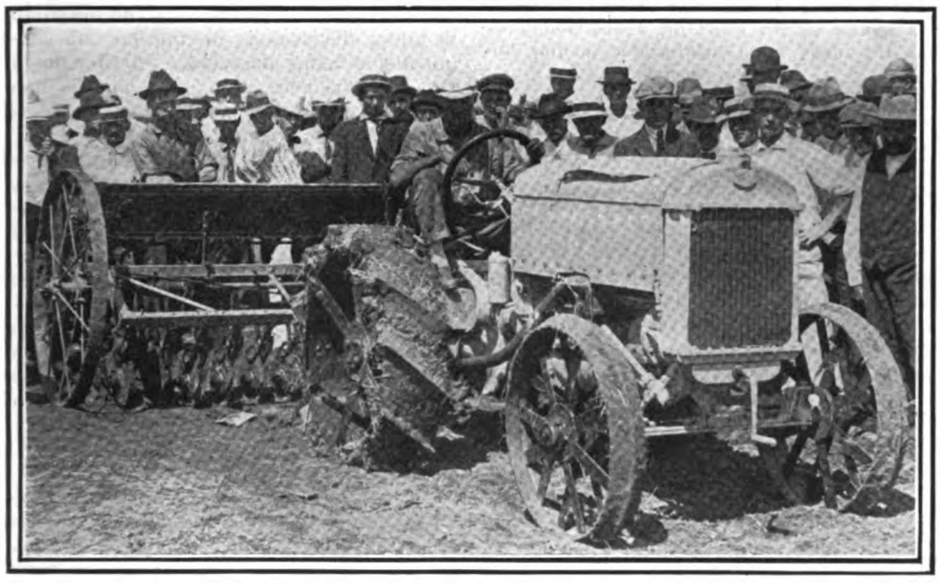
Gasoline	Commercial		
Ford	996	Chase	15
Packard	422	Kelly	13
Autocar	364	Mais	12
Pierce-Arrow	355	Gramm	11
Reo	243	Selden	10
Vim	197	Koehler	9
Studebaker	160	Flint	9
Peerless	136	G. M. C.	9
Jeffery	81	Indiana	8
Cadillac	75	Standard	5
Republic	65	Knox	5
Alco	48	Commerce	4
White	43	Crown	3
Federal	39	Decatur	2
International	27	Gaeth	2
Sampson	18	Modern	2
Denby	17	Motor Wagon	2
Stevens	17	Service	1
Signal	1		
Sternberg	1		
Veerac	1		
Miscellaneous	112		
Total	3,522		

Commercial Electric	
Baker	14
Waverly	12
Detroit	10
G. V.	10
Miscellaneous	8
Total	54
Grand total	3,576

TO BUILD TRUCKS IN BOSTON

BOSTON, MASS., Aug. 24—Projects are on foot to start two truck companies in Boston. One of them has been organized and the capital is nearly all paid in and the plans will be ready for announcement in a few weeks, according to a man who is to handle the advertising of the company.

The other company will not be started until later in the year. Back of the second company is a prominent dealer who now has the agency for a truck, and he plans to close up contracts with various parts makers and assemble the truck in Boston, give it his name, and sell it throughout New England. There is a prominent technology engineer and a contractor interested in the project with the dealer and they have ample finances to start it going.



Ford's tractor pulling a grain drill at the Fremont tractor demonstration

Ford Tractor Makes Debut at Fremont Trials

FREMONT, NEB., Aug. 11—Ford's new farm tractor, so long heralded and regarding which there has been so much speculation, appeared publicly for the first time at the great tractor demonstration held here the last 3 days. Over 90,000 people attended the trials. Both Henry Ford and his son Edsel, who constitute the firm of Henry Ford & Son, Dearborn, Mich., makers of the tractor, were on the ground. Gasoline, kerosene and alcohol were used with equal facility in the Ford machine, and with no apparent effect on performance.

The tractor is remarkable in that it has no frame or springs, the unit power plant serving as the support for the pivoted front axle and being practically integral with the worm-driven rear axle. The driver sits on a seat bolted to the axle unit, and the radiator, tank and hood are carried by the engine.

The engine is larger and heavier than the familiar Ford engine but almost identical in design, being 4 x 4¼, rating 25.60 hp. by formula. It is cooled by thermo-syphon circulation through a large pressed-steel tubular radiator. It has the Ford flywheel magneto. Electric light for night plowing is furnished from the same source.

The planetary gearbox is gone. In its stead is a multiple-disk-in-oil clutch and three-speed constant-mesh individual-clutch gearset. The conventional form of unit power plant is bolted to the flange of the solidly-cast rear axle, final drive being by worm gears. The wheels are of the agricultural type, 42 in. high in back and 40 in. high in front. Control is by means of the standard steering wheel, etc. The gasoline tank occupies the space above the cylinder block and forms the ridge-pole for the louvred hood.

The tractor is made to haul two plows, runs 5 to 6 miles per hour on the road, and can plow at from 2½ to 3 miles per hour. It is light in weight, weighing less than a ton, and will sell for less than the Ford touring car.

S. A. E. Standardizes Truck Control

Standards Committee Fixes Lay-Out of Gear Shifts

BUFFALO, N. Y., Aug. 14—Standard controls for trucks which will permit any driver to change from truck to truck without trouble were recommended at a meeting of the S. A. E. Truck Standards division held here to-day.

It was considered best not to specify either right or left steering location, as this does not affect the operation of the truck if all other things are the same. Thus the recommendations are as follows:

Gearshift and hand-brake levers always to be at driver's right. The gear lever nearest the driver and the brake lever to the right of the gear lever.

A latch or its equivalent for guarding the reverse slot should be provided for both three- and four-speed gearsets.

The position of the lever to give the different gears in a three-speed gearset should be the same as that already recommended for passenger cars.

In a four-speed gearset the highest gear to be in the same position as the highest in the three-speed, with the same successive motions for changing down. The low gear will then occupy the place taken by the reverse in the three-speed transmission. No particular position specified for the reverse position on a four-speed layout. The gear lever positions are as shown:

Three-speed	Four-speed
R 2	1 3
1 3	2 4

The gear positions should be clearly indicated on the gate or the base of the gearshift lever.

The hand-brake lever should be pulled back to apply the brakes.

Spark and throttle levers should be so mounted that they do not turn with the steering wheel. They should be pushed forward to advance the spark or open the throttle.

The accelerator pedal should be placed to the right of the brake pedal. These recommendations will be put before the full standards committee at the meeting in October. They are based upon practice to some extent and also on what, in the opinion of the division members, is really best for easy manipulation.

Discuss Military Requirements

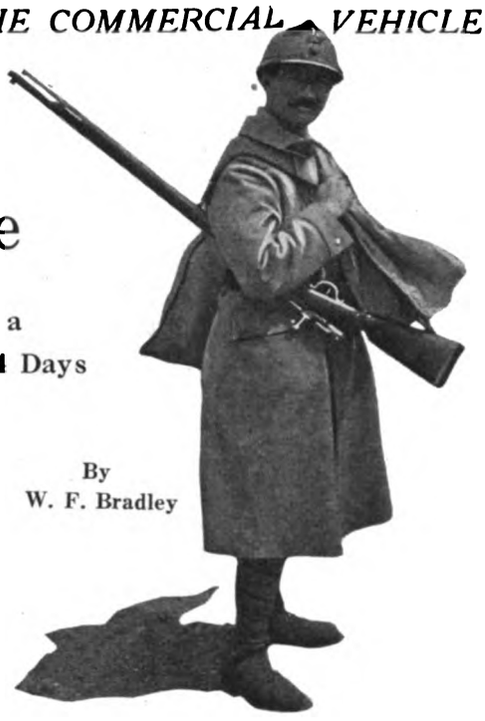
After the matter of controls had been settled there was a discussion of the military requirements. It transpired that the Quartermaster's, the Ordnance, Engineering and Auxiliary departments of the army would be truck users with somewhat different requirements and that other users would be the Signal Corps, the Aviation Corps and the navy. The Truck Standards division is working in conjunction with the S. A. E. Military Transport committee on this matter and is expecting a request for special work in the near future. At the Buffalo meeting it was suggested that if possible the division should commence discussion of specifications for that size and type of truck likely to be most in demand which would be the one for the Quartermaster's department.

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Teaching the Poilu to Drive

How the Army of France Makes a Truck Driver of a Novice in 4 Days

By W. F. Bradley



French motor driver, trained and equipped for service at the front. A bullet wound in the leg made him unsuited for further infantry service

TRAINING truck drivers under peace conditions and instructing men when war is in progress are two entirely different propositions. In peace time the most suitable candidates are selected. Their instruction may extend over several months and is always progressive. In comparison, the training of army truck drivers under war conditions has to be done over night. A nation at war and struggling for its very existence values men on an entirely different scale from that pertaining either in peace or under a vigorous preparedness boom. The military authorities put the stamp of the combatant on the youngest, the best favored physically—in a word, on the *elite* of the nation. Those too old or incapable physically of withstanding the tremendous strain of trench or open warfare are put into the auxiliary service, of which mechanical transport is one.

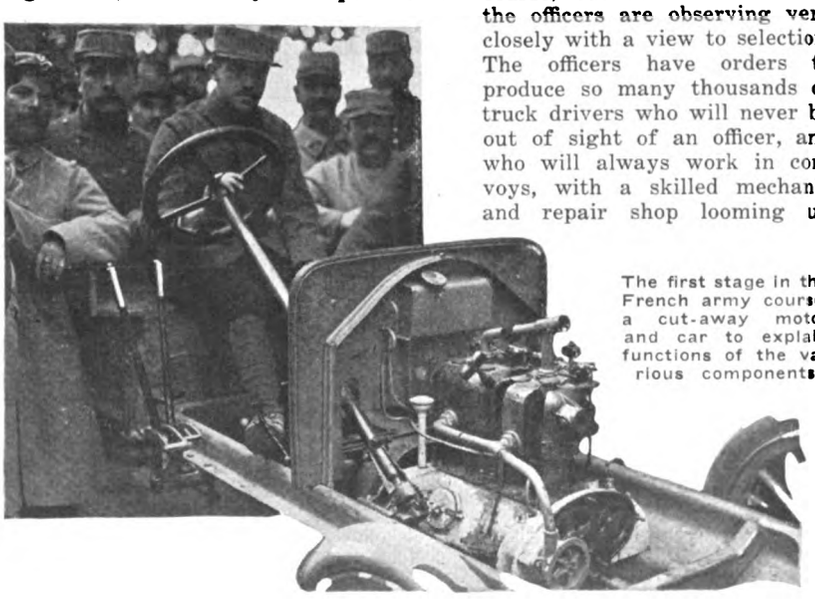
Fighting Material Not Used

Thus, as the war progressed, France found that she wanted more and more truck drivers. How many thousands she has, and how many thousands she is making, it is not permissible to say. But it can be recorded that the men who knew how to drive and were called upon during the first six months of hostilities are but a small proportion of those since trained and now being trained. In France the regimental depots pick out the men—men who are nearing or who have passed the age of 40, younger men who have been wounded at the front and are not considered fit to return to the firing trench, the military incompetents or weaklings who, under peace, might have altogether escaped army service—these are the men who are picked out and sent to the big school for the training of drivers.

In the selection the fact that the men have or have not had previous motoring experience is of little importance. As a matter of fact, in this stage of the war, few of them have even looked under a motor hood, and probably 85 per cent of them have never ridden in a motor vehicle. They represent all professions, but the agricultural element predominates. Mechanics and professional drivers have long found their special field of usefulness in this war of specialists.

Most Drivers Novices

The central school immediately puts its pupils through a theoretical and practical course, but at the same time the officers are observing very closely with a view to selection. The officers have orders to produce so many thousands of truck drivers who will never be out of sight of an officer, and who will always work in convoys, with a skilled mechanic and repair shop looming up in the background. Out of the material provided only a portion can be transformed into first-class drivers; generally men over 30 years of age and without previous experience are not much use in this department. But all, no matter how great their ignorance, nor how far removed their previous connections have been from motordom, can be transformed into competent truck drivers.



The first stage in the French army course, a cut-away motor and car to explain functions of the various components.

Primary Instruction

Upon the broad, shady banks of a river a score of groups are united around as many instructors. In the center of each group is an old touring car, a chassis or some component of a motor car. No. 1, for instance, will be a sectioned chassis, with its water jackets and cylinder walls cut away to reveal the pistons; the timing gear housing removed; the gear box open and the rear axle housing sawn through. In very simple language the instructor explains to the thirty men standing around him the A B C of a motor vehicle.

In the next group a gearbox only is being explained; in the next the magneto is under discussion; in another the carbureter is being dissected. Further down the line the rear axle of a chassis has been jacked up and men are learning the correct way to crank a motor.

A few yards on there is a similar chassis, also jacked up, with a man at the steering wheel learning the art of changing gears. The floor boards are removed and the cover taken off the gear box for the first few attempts, so that the man may understand what he is doing. Afterwards he must change with his nose in the air. Half of each day is spent in this theoretical instruction; the second half on the road under the direction of a driving instructor.

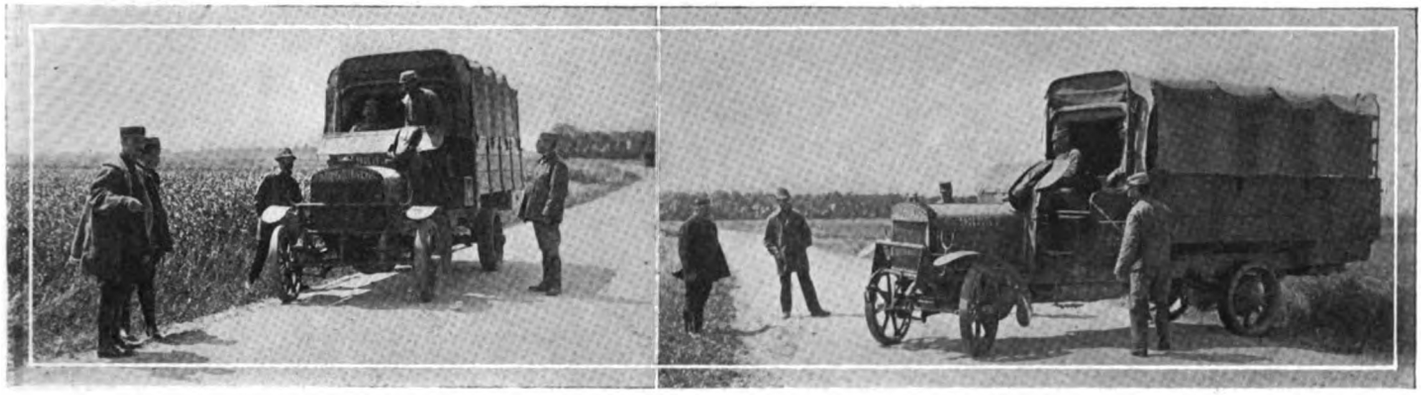
Only 4 Days of Theory

For the majority of the men this combination of theoretical and practical instruction does not last more than 4 days. By the end of that time the officers have been able to correctly judge the value of their pupils, and have picked out all those



His first day at the wheel, taking a trial spin with an officer walking at the side, giving advice

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Individual instruction on the road. At the left a green driver is being advised by his instructor, on the seat with him, while the assistant driver stands at the side of the truck, to the driver's left, to give him directions for turning. At the right, the driver is shown executing the turn, the officer having alighted to observe his work to better advantage. The bearded civilian is the author and well-known war correspondent W. F. Bradley.

who only attain a rather low average, and have transferred them to an entirely separate school established for the training of truck drivers only.

If, when they reach the truck school, the pupils can correctly name the different organs of a chassis and know the uses of the different levers and pedals, the officers are satisfied. In their day's journey to the school some of them have forgotten even this little. But, whatever their stage of development, the officers make a point of turning those men out of the school at the end of 15 days thoroughly competent to drive a truck under any conditions pertaining along the battle front. Of failures to come up to standard within this time there are not more than 2 or 3 per cent; of permanent failures there are none.

Training on the Road

An intelligent system, intelligently applied, has been necessary to get these results in such a short space of time. The pupils are collected in groups of eight, under the care of an instructor, and these groups work in convoys under the direction of one or two officers. For the first 2 days, however, the instruction is too individual for any attention to be paid to real convoy formation. The roads around the school, which is a considerable distance from any big town, have been divided into circuits of progressive difficulty.

No. 1 consists of straight, wide roads with very easy turns. The last of the series is all hills and bends, with some of the bends on the most difficult parts of the hills. As there are eight men on each truck, and each truck stays on the road 8 hr. a day, every many has 1 hr. actual driving, and is made competent in 15 hrs. actual driving.

All efforts are directed toward making the men who are not at the wheel profit by the experience of the man who is there.

Strict Discipline Maintained

Thus, discipline aboard is very severe, no talking being allowed and the instructor invariably explaining the mistakes so that the others may profit by them. Further, it is recognized that driving in a straight line is child's play, and from beginning to the end of the course no man is allowed to enjoy a straightaway run of more than a few minutes duration. In the early stages the men go through their gears, but are not in top more than a few seconds before they are ordered to stop and restart, or practise reverse.

Convoy Work Strenuous

After two or three days, when the men have passed from the individual to the convoy formation, and have to drive in unison with other vehicles, each pupil is given a mate designated an assistant driver for the time being. When one of the pair is acting as driver the assistant is standing on the left-hand step of the truck, where he is apt to be impressed with the fact that his vehicle is only one of a procession of 15. The instructor occupies the center of the front seat.

If a turning movement of any difficulty is ordered, the assistant must get on the road and give instructions to his companion at the wheel. For this purpose he is authorized to make use of five





Above—taking gasoline and oil for the school trucks. A record is kept of the consumption of each vehicle. Below—school convoy on the road, under the direction of officers

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Dinner time on the school grounds

words, and no more. They are left, right, ahead, reverse, stop. If he attempts to speechify or muddles his commands, the instructor interferes. The man on the road is thus obliged to think out the correct operations, and to shoulder the same responsibility as his companion actually in charge of the wheel and the levers. It is a system which has given excellent results, for it puts men on their mettle, and if one of the pair is stupid or careless the other makes his reform a personal matter.

Course Is No Lark

As during the individual instruction there is very little straight ahead driving, almost as soon as they have gotten going on a straight road, the whistle will be heard and the men will have to turn their trucks around simultaneously. Or, No. 1 truck will turn around and the others will have to follow in succession. Another maneuver is for the leader to be ordered down a narrow lane, the others following, then the whole convoy backing out. A few minutes later they will back into that same lane, so that the man at the tail of the procession may have to travel a quarter of a mile on his reverse.

These operations by convoys automatically reveal the weaklings and give excellent opportunities for the display of skill. A well-trained team of drivers nearing the end of their course will swing around with one use of the reverse and with almost mathematical precision. It is quite easy to understand that with proper training military truck drivers ought to better the wonderful precision obtained by horse artillery.

Toward the end of the training period night driving is carried out on one of the moderately difficult courses, naturally without lights on any of the vehicles, and through villages entirely lacking in artificial lighting. No man is passed as competent until he can go through one of these tests without a mistake. There is no necessity to create accidents, for the novices provide these unasked for. Advantage is taken of every truck which backs into the ditch or drops off the road to show the correct way of extracting it with the help of the companion truck, or, in very difficult cases, with the assistance of the motor workshop accompanying every convoy.

British Trucks Used

A standard vehicle is used for school purposes. They are Stars, and Tilling-Stevens, both English make, with Reos for the last few days and Pierce-Arrow 2-ton models as traveling workshops. There are some Whites and various French trucks, mostly employed on useful work around the school. The English trucks have double ignition, but only magneto is used, and as each vehicle visits the repair shop its battery ignition is removed. Throughout their course the men are taught to care for their trucks, to screw down all lubricators, to maintain the oil level, to keep the magneto and carbureter in adjustment, to remove stones from between dual tires, and other such simple matters. The demand is too urgent and the time too short to give them special theoretical instruction.

The Post-Graduate Course

While they have a view to regular and rapid output, the officers are always on the watch for men of more than average ability to be trained as superdrivers and break-down gangs. These men are not sent out at the end of 15 days, but are retained for additional training in the convoys, in the repair shop, and with the skilled mechanic in charge of each truck-workshop. The intention is not to create workshop mechanics, for the men have not usually had the necessary preliminary training to fit them for this, but rather intelligent drivers who can at once pounce on and remedy an accidental stoppage. These men are very valuable with a convoy of drivers of limited experience. As a practical test, a break-down man was left alone on the road with a truck having its ignition wires mixed, its carbureter jet choked and one of the driveshafts removed from the rear axle. Only if the man can discover the cause of the breakdown in a reasonable time is he considered competent.

One of the interesting features of this work is the material organization of the schools. Before the war none of the European armies trained truck drivers, and even a year ago no machinery for this purpose existed in France. Further, these schools are temporary; most of them will be swept away when the war is over. Thus they have to be organized on the most economical basis possible. The officers in charge have to create everything—huts, mess rooms, kitchens, workshops, baths—and while doing it have to turn out drivers.

On Their Own Resources

One particular case is interesting. A group of reserve officers, most of whom had seen service at the front, were put in possession of an abandoned shoe factory, by the side of a stream, 2 miles from the nearest village. The place had never been successful as a shoe factory, and had been empty for 10 years. In less than 3 months, without any outside aid whatsoever, the officers and men had transformed the factory and surrounding grounds so that they could accommodate more than 2000 men and turn out 00* competent drivers every day.

The factory did not provide sufficient sleeping accommodation; thus wood sheds were erected. There were no sanitary arrangements; the captain in charge designed a modern system and the men executed it. There were no artificial light; a single-cylinder gasoline motor and dynamo were installed, and at the same time the water wheel, which had been rotting for 10 years, was repaired to drive another dynamo. There was no washing accommodation; some of the lower factory rooms near the water wheel

*No figures to be published by request of the War Department.

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were concreted and hot and cold douches installed. The furnace for supplying hot water was fed entirely on camp refuse. There was an old lock on the mill race; it was cleaned out, modified, and made into an excellent swimming pool. There was no kitchen; the men built one. There were no store houses; they were made out of American wood, which cost nothing.

As American trucks were discharged from steamers at the French ports, they were loaded up with the wood which had been shaped into boxes at Cleveland, Detroit or Kenosha. The truck drivers dropped this wood where required on the initial trip from port to army base. The officers had no mess room; they built an extension to their central offices out of this American wood. The civil authorities declared that the school trucks would destroy all the roads within a 10-mile radius. The officers replied by picking from among the pupils a professional road surveyor and three or four men whose occupation in civil life had been road making. They repaired all damage as it occurred. It is doubtful if purely military officers could have done all this; but the officer in charge of the school, while holding captain's rank in the army, was an engineer and public contractor in civil life; his second was a building surveyor for the Paris municipality.

Mechanical Repairs

The school had to be independent of outside aid for its mechanical repairs. Thus a lieutenant with an engineer's training was given three lathes, a couple of drill presses, a gasoline motor and dynamo, a set of empty buildings, and a number of men. In a couple of months he had a good machine shop, a forge, a body shop, and his men comfortably housed around. Except that gearboxes were massacred on a big scale, the school repair shop work did not differ materially from the work of any other mechanical shop.

Taylor's Organizing Genius Keeps Guns Fed

(*Continued from page* 13)

to any of the trucks at night, he himself determining what repairs shall be made and how, and attaching the tags to the vehicles for the guidance of the two night repairmen.

Although the entire truck fleet is comparatively new and should therefore not need any considerable repairwork under ordinary conditions, its 24-hour-a-day work for several months put it to a severe test. The excellent condition of the equipment is demonstrated by the fact that it has not been necessary to employ any repairmen in the garage during the day. Taylor himself attends to the repair of any magnetos during his spare moments during the day.

Worked Out a System

Taylor is busy every minute of the day, and for the first 6 months with the Bliss company his day often stretched over from 16 to 18 hr., for in this period he not only had to form his organization and keep the wheels of the trucks actually turning on the roads, but he also had to work out a system for keeping a record of what each truck did every day, how many miles it made, how much gasoline and oil it used, what repairs were made to it and the cost of the repair parts and the labor in applying them.

Each driver must make out a daily report card showing the number of trips made each day, the load carried on each and the times of departure and arrival. Each truck has its own card kept in Taylor's office on which the supplies and materials used by that truck are recorded. At first, Taylor had to devise and keep these records himself, but now he has an assistant to handle this work under his direction.

Another novel system, worked out by Taylor to show graphically the condition of the motor of each of his trucks, consists of three blocks of cross-sectional paper, one above the other, all on one large sheet. One block is used to show the mileage covered each day over a period of 1 month; the second shows the gasoline consumption for the same period and the third the oil used. The vertical lines denote the days of the month in each case and the horizontal lines the mileages in the first block, the gallons of gasoline in the second and the pints of lubricating oil in the third. The figures for each of these items are spotted on the cross-sectional blocks and curves drawn. The averages of these curves indicate graphically the miles per gallon of gasoline and the miles per pint of lubricating oil. These averages indicate the condition of the motor valves and show when the carbureters need adjustment. These curves are made out for each truck and have been of great value to Taylor in directing his attention to the necessity of valve grinding and carbureter adjustment to reduce the gasoline consumption.

Assistant Now Plots Charts

These charts are now plotted daily by Taylor's assistant, which has given Taylor the opportunity to devote more of his time to decreasing the idle loading and unloading time of the trucks on their routes. Taylor's attention to this important consideration has resulted in carrying the partly-finished munitions in stand boxes which can be unloaded quickly from the truck bodies by the use of elevating handtrucks, thereby saving much time over the usual method of pushing the ordinary cases off the truck on small wood rollers or on ordinary handtrucks.



Unloading provisions at the school cook house. The structure was designed by school officers and built of American motor truck packing cases

Book Reviews

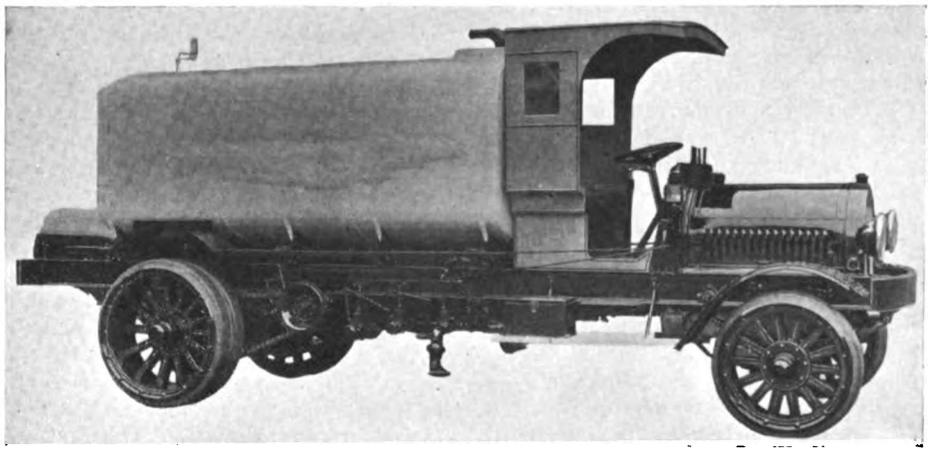
"446 Repairshop Short-Cuts" is the title of the latest edition of this republication of kinks described in *Motor World* and published by The Motor World Publishing Co., 239 West Thirty-ninth Street, New York City. As the name suggests, this volume contains 446 of these short-cuts, most of them illustrated by thumb-nail sketches.

Every man who has anything to do with the care or repair of motor vehicles of any kind has need for the clever methods of solving perplexing problems of the repairshop, described in this book. It sells for $1.

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Motor Street Flushers Effect Large Economies

Savings Expressed Not Only in Dollars but in Superior Work Performed —One One-motor and One Two-motor Type Described



A Tiffin motor flusher equipped with two independent motors, one for providing the water under pressure and the other for propelling the vehicle. The tank has a capacity of 1500 gal. The propelling motor is of the six-cylinder type. The vehicle is provided with an electrical starting and lighting system and can be had with an option of chain or worm final drive

MOTOR-DRIVEN street sprinklers and flushers are fast superseding horse-drawn vehicles because of the great economy effected. This economy is, of course, first expressed in dollars and cents, but the motor equipment has many other advantages over the horse-drawn apparatus. One motor sprinkler or flusher will do the work of several horse units, and do it quicker, better and at the same or a lesser cost per unit area cleaned.

Due to the greater speed of the motor apparatus, it is able to cover a larger amount of territory than the horse vehicles and to make the runs between the filling points and the areas to be cleaned in much less time. Due to the larger capacity of the tank usually fitted on a motor sprinkler, the trips to the filling stations are less in number, thus adding to the efficiency in that a larger percentage of the unit's time can be spent in actual work on the streets.

Besides doing the work quicker than horse equipment, the motor apparatus does it better, due to the fact that in practically all types of horse sprinkling or flushing vehicles the water is forced out through the nozzles by gravity alone, whereas with motor-driven apparatus the water pressure may be so regulated by mechanical means as to give the best results according to the class of street being cleaned and the amount of material to be removed. Again, motor equipment is clean, whereas horse apparatus expend considerable of their energy in flushing off their own dirt.

Motor flushers are less liable to create traffic congestion than horse vehicles, because of their greater speed and maneuvering ability. Their speed also enables them to be garaged out in the suburbs, where rents are lower than in the city, thus effecting a considerable saving in the cost of storage space.

Two of the various makes of motor-driven street sprinkling and flushing apparatus now on the market are described and pictured on this and the following pages. The first of these, manufactured by the Tiffin Wagon Co., Tiffin, Ohio, differs from other types in that a separate gasoline motor is provided for furnishing the sprayed water under pressure, the vehicle itself being propelled by another motor. The Tiffin apparatus is offered in five motor-driven models, with tank capacities of from 900 to 1500 gal., in addition to one 720-gal. tank model mounted on a horse wagon but equipped with a gasoline motor for furnishing the water under pressure. These models are carried in stock, the Tiffin company manufacturing the motor truck chassis on which the apparatus is mounted as well as the apparatus itself.

The other type of flusher described was designed by A. F. Masury, chief engineer of the International Motor Co., New York City, and mounted on a Saurer chassis. In this type the pump for furnishing the water under pressure is driven off the propelling shaft of the vehicle. This pressure is varied by the speed of the motor or that of the truck.

Five Models in Tiffin Line

The Tiffin line is a most complete one, consisting, as it does, of five motor-driven models, with tank capacities of 900, 1000, 1200, 1400 and 1500 gal. respectively. The 1000-gal. model is identical in general type with the 900-gal. unit, each being mounted on a four-cylinder Tiffin motor truck. The other mod-



One of the Tiffin 1500-gal. tank motor flushers in operation. Note how the nozzles are set to throw the water across the truck's path from left to right and from right to left, so that the entire width of the street is flushed while traveling in one direction

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els are mounted on Tiffin trucks with six-cylinder propelling motors, and equipped with electric starters and lighting systems, with the option of either chain or worm final drive.

The flushing and sprinkling apparatus, together with the motor and pump, are the same on all five models, the various machines differing only in the sizes of the truck chassis to carry the tanks of the various capacities, with the exception that the flusher motors on the three largest models are equipped with electric starters.

The adoption of the two-motor principle on the Tiffin apparatus is specially advantageous, in that the pressure of the water sprayed can be regulated independently of the speed of the truck motor or the speed of the truck itself. Further, the truck-propelling motor, being called upon to do nothing but propel the vehicle, can be made relatively smaller than the one-motor apparatus, with a lesser gasoline consumption, because the flusher motor is only operated when the water is being sprayed and not when the vehicle is running to and from the points of water supply and the areas to be flushed.

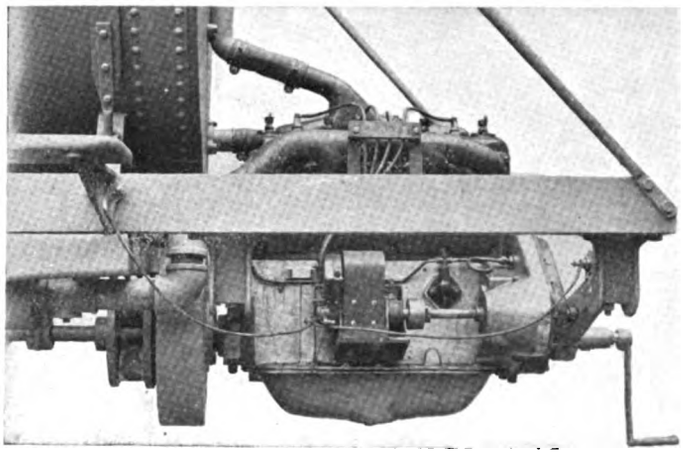
In design the Tiffin units consist of stock motor truck chassis with cabs and either circular or straight-sided tanks, with rounded bottoms and tops, carried on special steel frames, the side members of which are attached to the tops of the vehicle frames. Each tank frame is carried aft of the chassis side members for a sufficient distance to carry the flusher motor, as shown in the illustration in the middle of this page. The extreme ends of the flusher motor frame are supported by means of tie-rods riveted to the tank, as shown at the top of this page. A removable semi-cylindrical metal cover is fitted over the motor to protect it from the elements.

The flusher motor is a four-cylinder type, with 3½-in. bore and 5-in. stroke, and drives a two-stage centrifugal pump in front of it by means of a flexible coupling. It can keep the water at a pressure of 60 lb. per square inch during a discharge of 250 gal. per minute, but with a lighter discharge this pressure can be effectively carried as high as 75 or 80 lb. The spark and throttle controls and a cut-out switch for the motor are operated from the driver's seat. The tank, flusher motor and centrifugal pump are all carried by the frame mounted on top of the truck chassis and may be easily removed during those winter months when flushing is impracticable, thus enabling the truck to be equipped with a different form of body for other work during this period.

From the centrifugal pump the water is carried forward in two manifolds beneath, and parallel with the chassis side members, to four flushing nozzles, two amidships and two in front of the front wheels, one on each side in each case.



A rear view of one of the Tiffin two-motor flushers and sprinklers, showing how the independent motor for supplying the water under pressure is mounted on an extension of the framework on which the tank is carried. A semi-cylindrical cover to protect the motor from mud and dust is regularly fitted, but is removed in the view shown for clearness

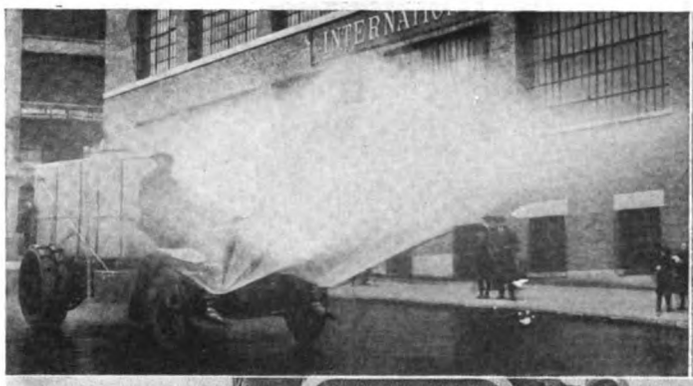


To the left, a close-up view of the independent motor fitted on the Tiffin apparatus to provide the flushing water under pressure. It is joined to a two-stage centrifugal pump beneath the tank by means of a flexible coupling

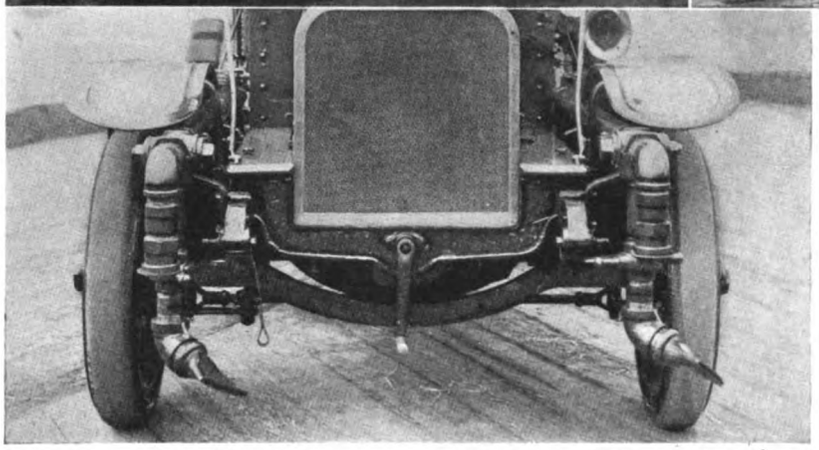


A 1000-gal. tank flusher and sprinkler designed by A. F. Masury, chief engineer of the International Motor Co., and mounted on a 5-ton Saurer chassis. This vehicle is in the service of the Philadelphia, Pa., municipal authorities. The centrifugal pump provided for furnishing the water under pressure is mounted concentrically with the main truck driveshaft and is driven off it by means of an overrunning clutch

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At the extreme left, top, a 1500-gal. tank flusher and sprinkler mounted on a 6-ton Saurer chassis in use at Atlantic City, N. J. Note how the water is sprayed for sprinkling purposes. Directly above, the same apparatus with its flushing nozzles in operation

Close-up front view of the Atlantic City Saurer apparatus, showing the construction of the flusher and sprinkler nozzles, the former being at the bottoms of the two vertical pipes

By means of control levers mounted in the driver's cab one or more of the nozzles can be operated in any desired combination. The nozzles, being set in universal joints, can be set at any desired angle to spray the water as required. Two streams may be directed to one side of the street, or, by operating one forward nozzle and one amidships across the truck's path, the entire width of the street can be flushed while traveling in one direction.

The forward flushing nozzles are interchangeable with three-port sprinkling nozzles, which can be substituted in a few minutes' time. Sprinkling may be done by the water under gravity alone or under pressure, and by means of the three-port nozzle any range of throw or desired discharge can be obtained.

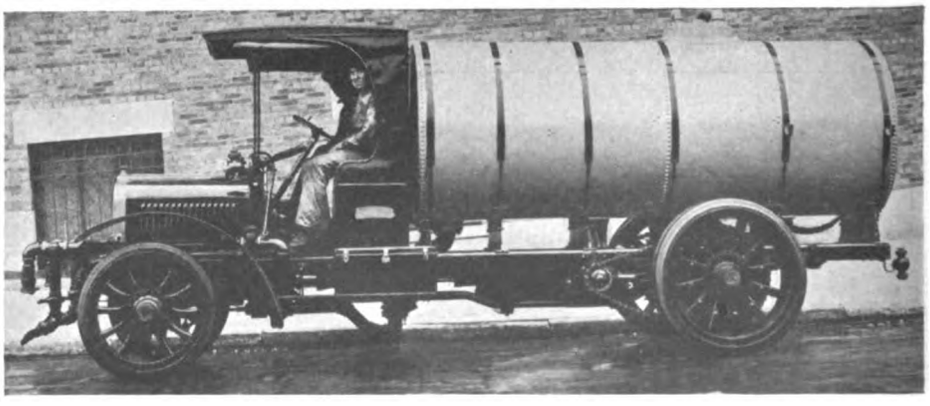
Provision is made for filling the tank either from a hydrant or from a standpipe, while extra equipment can be secured for pumping the water from rivers.

The two types of the International company's combination power flushers and sprinklers mounted on Saurer chassis, and shown at the bottom of this and the preceding page are identical in design except for the capacity and shape of the tanks carried and the capacities of the trucks. The unit shown in the illustration at the bottom of this page is equipped with a cylindrical tank with a capacity of 1000 gal. This vehicle, a 5-ton Saurer, was purchased by the Philadelphia, Pa., municipal authorities. The other apparatus shown just above was built for Atlantic City, N. J., and is fitted with a rectangular-sectioned tank with rounded corners having a capacity of 1500 gal. The chassis is a Saurer 6-tonner.

Over-running Clutch Drives Pump

In each vehicle the water is furnished under pressure by means of a two-stage centrifugal pump mounted concentrically with the main truck driveshaft. It is operated off the driveshaft by means of an over-running clutch. The weight of the pump is held by the truck frame. The pump impeller is mounted on a hollow shaft, through which the main truck driveshaft passes; and as the clutch operates through the impeller, only a torsional strain is placed on the driveshaft.

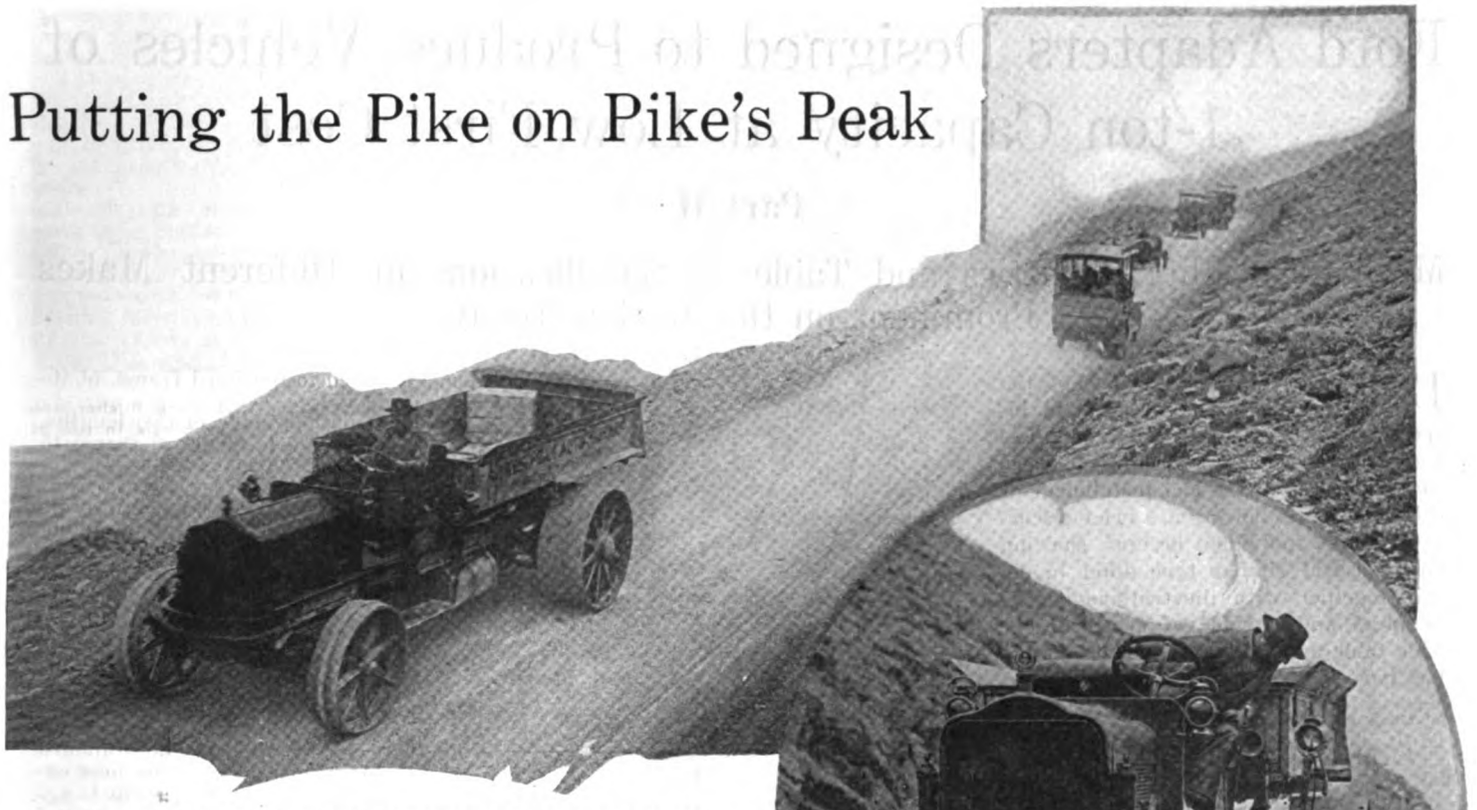
Under normal engine speed the pump supplies water at from 20 to 40 lb. pressure and has a maximum capacity of 500 gal. per minute. From the pump outlet the water is carried forward in pipes on either side of the truck to the sprinkler and flusher nozzles, which are located in front of each front wheel, as shown in the lower view in the illustration at the top of this page. Each pipe is fitted with quick-opening valves operated by levers in the driver's cab. These enable the driver to open either the right or left pipe at will. Although the water for both the sprinkling and flushing nozzles on each side is taken from the same pipe, this offers no difficulty, because sprinkling and flushing are never done simultaneously. As shown clearly in the illustration at the bottom of this page, the end of each pipe is provided with a T-coupling, the sprinkling nozzle being carried at the bottom of a nipple screwed into an elbow at the extreme front end of the T. The flushing nozzle is carried at the bottom of a vertical nipple screwed into the middle opening of the T. The flushing nozzle is nearer the ground than the sprinkler. The T mentioned above is provided with a three-way valve controlled from the driver's seat, which enables the water to be fed to either the flushing or sprinkling nozzle at will.



Side view of the Saurer 1000-gal. tank unit, showing position of flusher and sprinkler nozzles in front of the forward wheels

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Putting the Pike on Pike's Peak



White Good Roads truck putting the finishing touches on the road while buses carry spectators

THANKS in part to the labors of a White 5-ton Good Roads truck, the score or more of racing cars that scaled Pike's Peak on Aug. 12, competing in the first Pike's Peak hill climb, had a roadway as smooth as a park boulevard where formerly there were nothing but precipitous winding trails and a cog railroad to the summit.

At an altitude nearly 3 miles above sea level, this truck worked for 2 months putting the finishing touches on the road, hauling road material, dumping it where needed, spreading it when necessary, pulling road machinery and finally rolling the surface to hard smoothness.

In addition to these labors it also hauled all of the supplies needed for the race to the starting point. It hauled part of the 360 tons or 18 carloads of high explosives with which the original blasting was done. Finally it was fitted with a water tank and just before the race it sprinkled the full course.

Fourteen miles up the grade, at a point 13,000 ft. above sea level a parking space for 7000 cars was prepared, and to this point a number of motor buses constantly plied. At this point 95 per cent of the road is constantly in view.

It was the original intention to have a truck event in the climb, but it was later abandoned. However, but for the strenuous activity of this truck on the hill, it is possible that the light racers which contested would have found it much more difficult to make the records they did.

Broad steel-tired wheels act as rollers in smoothing Pike's Peak Road prior to the race



At Mackinaw City, the end of the run, the truck in the lead

Good Roads Men Tour Bad Roads

TURNING from Pike's Peak, we come now to a pike without a peak, the East Michigan Pike, a link in the Dixie Highway. Unlike the Pike's Peak road, this pike is mostly in bad shape, but it is hoped to improve it and thereby increase touring traffic over it.

To encourage this sort of improvement the Good Roads Committee of the Detroit Board of Commerce recently conducted a tour 400 miles in length in which over 100 Detroiters in twenty cars took part.

Here again the truck was indispensable, not to make the road this time, but to get over it with the baggage of the tourists. The truck was a Federal 1½-tonner, and in spite of seventy-five pieces of baggage and 600 lb. of iron ballast to make up the capacity load, it kept up with the tourists from Detroit to Mackinaw City, 400 miles, arriving but 10 min. after the touring cars.

Sand and gravel predominated as a road material, although there was one sizeable stretch of corduroy road through the jack pine woods. Concrete and macadam were curiosities.

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Ford Adapters Designed to Produce Vehicles of 1-ton Capacity at Low First Cost

Part II

Mechanical Characteristics and Table of Specifications of Different Makes Prominent on the Market Today

DIVERSITY of design is one of the chief points to be observed in inspecting Ford commercial adapters. The main classifications according to type were discussed in the last installment of this article. Following are brief discussions of the individual designs, showing how those of similar type differ in detail, together with illustrations of the adapters and a table of specifications. This table appears at the bottom of the last page of this article.

Frame Extensions

Forbes

Walter J. Forbes, Boston, Mass.

AN extension, pure and simple, is what the Forbes commercial converter for Ford chassis consists of, the back and front ends of the Ford being identical with the stock chassis.

The Forbes extension comprises patches which are placed at about the middle of the Ford frame, the joints being of the lap type, securely riveted and swedged to a tight fit. The frame is reinforced at the point by the introduction of a cast yoke cross-member and truss-rods running the length of the frame.

The rear assembly is not disturbed at all, the extra length of shafting being provided by an extension shaft and torsion tube which is rigidly attached to the Ford torsion tube at its front end and anchorcd by a globe joint to the yoked cross-member. Running-boards are extended and braced, and a new one-piece filler is placed between each running-board and the frame, the same fenders being employed. One extra leaf is inserted in the rear spring to sustain the extra weight.

H-D

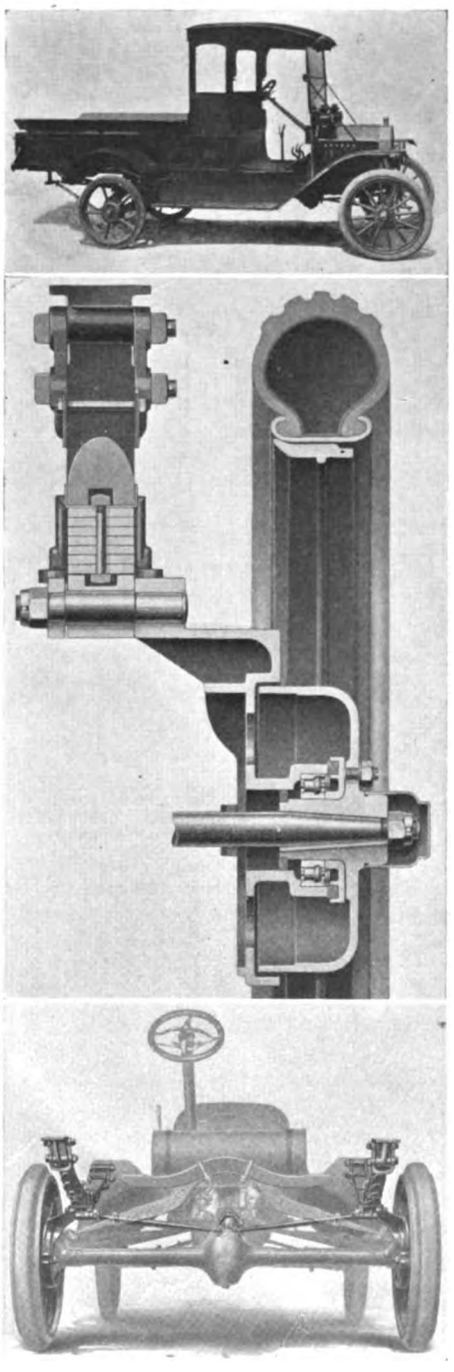
Hayes-Diefenderfer Co., New York City

PERHAPS the simplest of Ford frame extensions is the H-D. It is attached to the rear end of the regular Ford frame by clamps, and does not require the removal of any frame part. The rear cross-member of the Ford frame remains intact, being duplicated at the rear of the H-D extension.

The Ford torsion tube, driveshaft, radius rods, rear axle and spring are detached in a unit and moved back to the end of the H-D extension, to which they are attached. The connection between the gearset and the front end of the Ford torsion tube and shaft is attained by an extension torque-tube bolted to the gearset at the front and to a yoked cross-member, bolted to the Ford frame, at its rear.

The H-D unit is made in two lengths, one of which extends the Ford frame 15 in. and the other 30 in.

The Hayes-Diefenderfer Co. is New York agent for the Olsen unit, and by its use in combination with the H-D extension additional capacity and load platform length are both attained.



Olson Unit, in three views. Above, Ford commercial vehicle with Olson rear system applied. Center, sectional view of wheel, hub and bracket. Bottom, rear view of Ford with Olson attachments in place

Longford

Motor-Accessory Distributing Co., Boston, Mass.

MADE to extend the length of a Ford to accommodate a more commodious body than can be fitted to the standard Model T and also to increase its load capacity slightly, the Longford outfit is applied to the Ford by overlapping an extended rear frame over the regular Ford frame, forming a telescoping joint at the middle of the assembly, the moving of the Ford rear cross-member with the rear spring and the axle to the back of the frame extension, the insertion of a shaft extension, a yoked cross-member in place of the rear Ford cross-member at the back of the old frame, the application of trusses under both frame reaches and under the axle, and the insertion of two additional leaves in the rear spring. The job is finished by applying additional running-board brackets and a running-board extension.

The result is a chassis which is very similar to the old Ford chassis, except that it is longer and has its frame extended back beyond the rear axle so as to constitute a firmer support for the overhanging body.

Auxiliary Hubs

Olson

Swedish Crucible Steel Co., Detroit, Mich.

DIFFERING in principle from all other Ford adapters, the Olson unit is also the cheapest reinforcing means and the only one which retains the normal Ford wheelbase. It consists simply of a pair of special rear wheels with independent external bearings which depend from the body through the medium of semi-elliptic auxiliary springs.

In the Olson unit, although the entire Ford chassis is retained intact, there is actually less load strain on the axle, even with a 1-ton load in the body, than there would be in the case of an ordinary five-passenger touring model. This is because the entire extra body weight is taken by the auxiliary side springs, which have no connection either with the frame of the chassis or with the axle. The Ford

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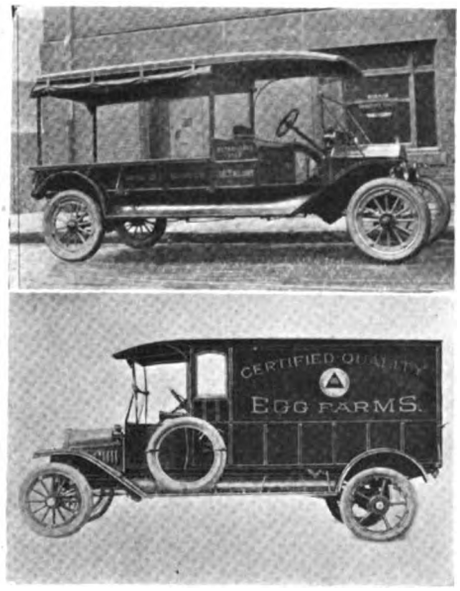
gear-ratio remains the same in each instance, greater pulling power being obtained by the use of smaller wheels when necessary.

Although steel wheels are standard on the Olson outfit, wood ones are also being supplied. Either pneumatic or solid tires may be fitted, but with pneumatic tires it is not practicable to carry such large loads.

Besides the Olson unit itself, the company sells bodies, one of its specialties being a balanced gravity dumping type with a capacity for 1 ton, which sells, complete with the Ford chassis, for $545. Besides this type there are several other standard types at the same price.

The Olson reinforced wheel and hub is applied by removing the wheel from the axle and inserting the cast-steel bracket back of the brakes. The Olson wheel is then applied and the spring, which pivots on the bracket, is bolted to the bottom of the body floor or sills. Auxiliary radius rods of the same V design found on the Ford chassis are provided to support the brackets in an upright position, these being anchored at the rear of the load platform.

The entire load stress imposed by the body is transmitted through the brackets to Bower roller bearings located in the center of the wheel plane, so that the axle becomes a floating one to all practical purposes.



Two types of extensions applied to Fords. Above the Forbes, retaining the Ford rear system. Below the H-D extension combined with the Olson rear unit

Wheel diameters of 31, 28 and 24 in. are offered, each giving the equivalent of a different gear-ratio, although the standard Ford driving gears remain unaltered.

Chain-driven Types

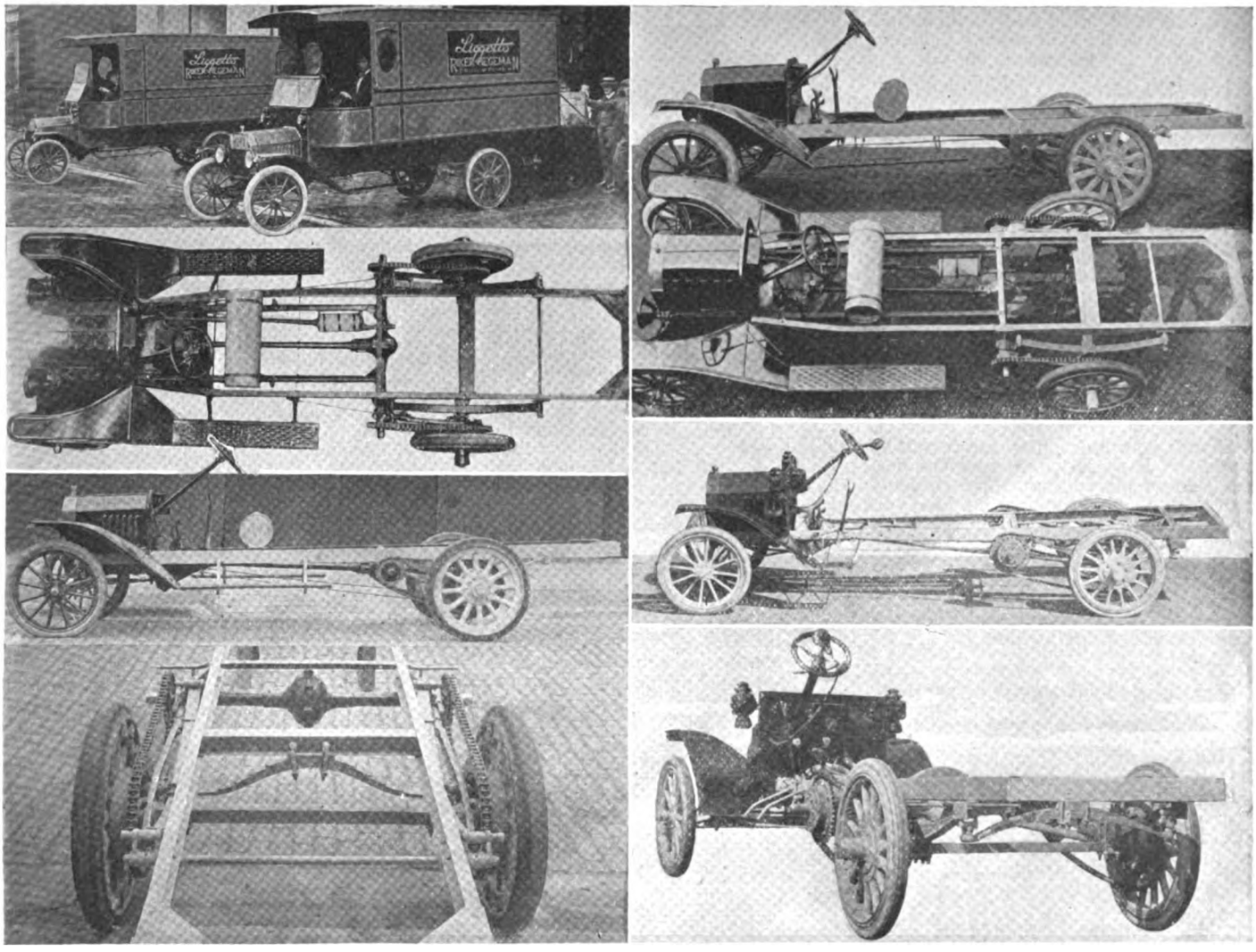
Dearborn

Dearborn Motor Truck Co., Chicago

FULL-LENGTH frames are used on Dearborn attachments, the extended frame being 32 in. wide and 4 in. deep. It is necked in at the front, where it bolts to the Ford frame on each side of the engine. The only other place of attachment is at the rear of the Ford frame, where a cross-member of the Dearborn frame is provided with brackets to brace the rear end.

At this point the Ford axle is attached to the frame by rigid brackets, the Ford rear spring being discarded. A helper spring, in addition to the half-elliptics of the adapter, is mounted just over the rear axle.

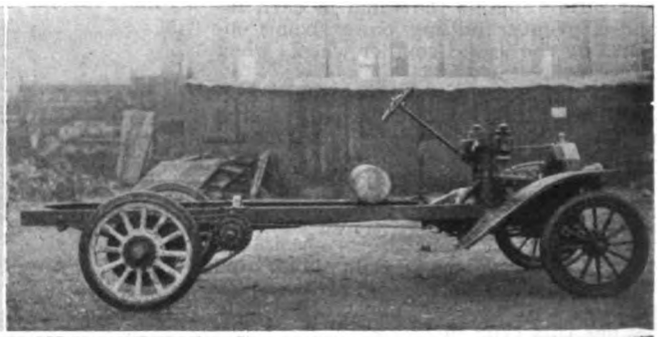
Internal expanding brakes in the rear wheels are carried by the radius rods and actuated by extension pull-rods from the hand lever. The Dearborn unit is riveted to the Ford frame and is intended to be a permanent job.

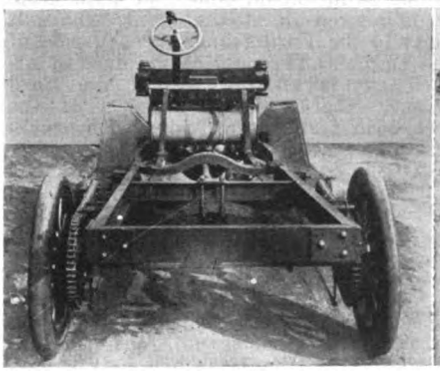


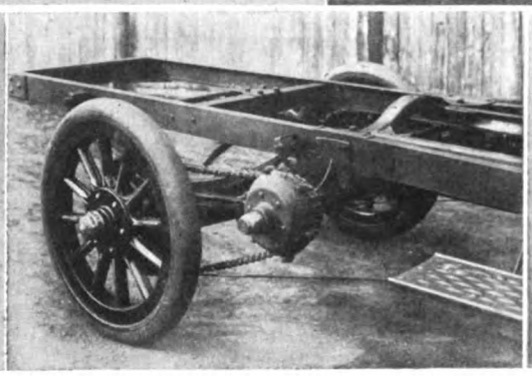
Chain-driven commercial adapters applied to Fords. Upper left, the Union complete, with an overhead chassis view just below it. Upper right, side and overhead views of the Smith Form-A-Truck. Lower left, side and rear views of the Dearborn converter. Lower right, similar views of the Evans, showing platform rear springs

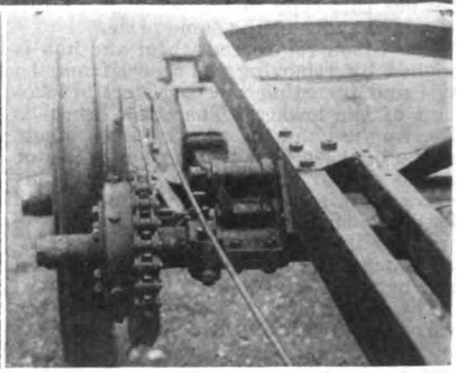
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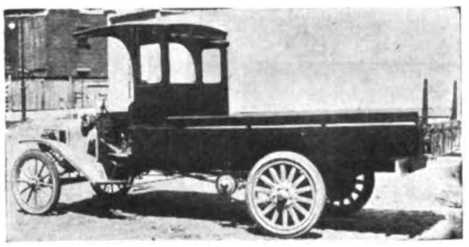








Above, the Woodward outfit with an ice body. Below, rear of the Franklin adapter



Above, center, details of Franklin construction, showing bolted connection and bell sprocket. Below, the Redden converter applied

Above, side view of the chain-driven Rayford. Below, detail of drive system of Rayford

Evans

Automobile Mfg. & Engineering Co., Detroit, Mich.

DEPARTURES from standard design in chain-driven adapters are found in the Evans unit for transforming the Ford into a commercial vehicle. The auxiliary frame does not extend quite up to the dash, from whence it flares outwardly so that its widest portion is at the extreme rear. The auxiliary springs are of the platform type, the cross-spring being lighter than the others, so that it takes the load when running light, transferring it to the side semi-elliptics when a full load is carried.

The Ford rear axle and rear cross-member are both retained, together with the V-shaped radius rods to brace the Ford axle jackshaft. The radius rods between the Ford jackshaft and the dead axle are so placed that their thrust is transmitted approximately in line with the Ford radius rods, thus minimizing the stress upon the jackshaft and the jackshaft brackets.

On the Evans unit the Ford service brake on the gearset is not used, but instead the pedal is connected with the rear wheel brakes of the adapter.

Franklin Two-way Converter

Franklin Two-way Converter Co., Chicago

QUICK changing from commercial to passenger form is the object of the design of the Franklin adapter, which is of the chain-driven form. None of the Ford parts is injured by the change, and can readily be put back in its accustomed place and the Ford touring car restored intact. Standard tread is another feature.

These results are accomplished by the shape of the extension frame, which lies entirely away from the narrow Ford frame and is secured to it by a few bolts. Brackets hold the axle to this frame, and they, too, may be loosened very readily. The narrow tread is accomplished by the form of sprocket employed on the Ford axle in using it as a jackshaft. These sprockets are of the overhanging type, so that the chain is carried closer to the frame and at a place where the chain pull comes more nearly coincident with the axle bearing. The sprocket and its hub interchange with the Ford wheel.

A helper spring is used over the solid rear axle of the unit.

Maxfer

Maxfer Truck Co., Chicago

FEW changes are made in the Ford chassis in equipping it with the Maxfer attachment. This device is of the chain-driven class, with the Ford axle, without any change, as a jackshaft. It has the usual frame extension of full length and standard tread.

The latter feature is made possible by the use of a bell sprocket, which brings the teeth back over the brakes, where, besides allowing a 56-in. track, the pry on the bearings is less.

Redden Truck Maker

Redden Motor Truck Co., Detroit, Mich.

EASE of adapting the Ford chassis has been the feature sought in the design of the Redden attachment. It is of the double-chain-driven type, using the Ford axle as a jackshaft and an extension frame. This frame is of only slightly greater width than the Ford frame, and is applied by sliding over it from the rear, forming a telescope joint, which is made fast with bolts.

No change is made in the Ford except to remove the rear springs and attach the radius rod brackets in their stead, to remove the rear wheels and substitute them for the front wheels, and to connect the brake rods to the expanding brakes in the rear wheels. Since no other changes are made, it is an easy matter to convert the chassis back to its original form for use as a passenger car again.

The Redden company is also making similar attachments for Dodge, Overland and Maxwell chassis.

Simplex Truckform

Simplex Truckform Co., Chicago

CLAMPS instead of bolts or rivets attach the Simplex device to the Ford chassis. The auxiliary frame stops short of the dash, at which point quick-action clamps serve to bind it to the Ford frame, other attaching points being at three places on the axle, from which the Ford spring has been removed.

The Ford axle serves as a jackshaft without any alteration whatever.

Smith Form-A-Truck

Smith Form-A-Truck Co., Chicago

ONE model of chain-driven attachment only is produced by the Smith company, which is the largest manufacturer of these devices in the country. The Smith adapter retains the Ford axle, adapting it by cutting off the brake flanges and bolting the axle to brackets on the auxiliary frame so that it becomes a jackshaft. The brakes in the completed

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Smith truck are in the rear wheels, connected with the same hand lever as regularly used.

A recently added feature of the Form-A-Truck outfit is the Strong sight-feed oiler for the Ford engine. This is used because the duty to which the engine is put in commercial service is more stringent than in passenger work, so that certainty of lubrication becomes of especial importance. It consists of a pump which lifts the oil from the flywheel housing, conducts it through a sight-feed on the dash, and from thence over the timing gears at the front of the engine.

The Smith device is provided with a helper spring over the rear axle.

Tonford

Detroit Truck Co., Detroit, Mich.

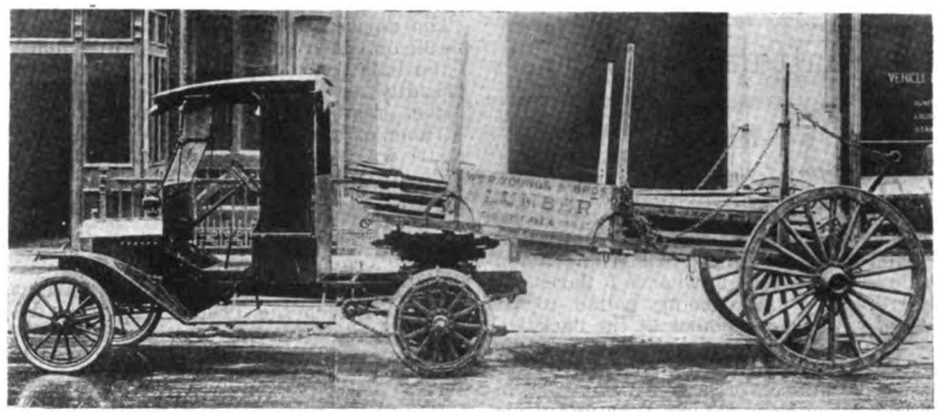
DRILLING four holes in the Ford frame permits the Tonford to be attached. The rear spring must be removed, the extension frame brought up and bolted to the Ford frame, and the rear axle must be bolted to the jackshaft hangers on the extension frame, the rear wheel brakes connected, and the job is done. The Ford axle serves as the jackshaft for the double chain drive.

Union

Union Truck Mfg. Co., New York City

MADE in both truck and tractor forms, the Union truck attachment is conventional in design but is marketed in an unusual manner. The attachments may be bought outright and attached to a Ford chassis outside of the shop, but the more usual method is to have it done in the Union plant. They may be bought on cash or credit, and if desired the complete truck chassis including the Ford can be purchased.

With the Union attachment, when applied to the Ford complete, goes a guarantee in lieu of the guarantee of the Ford company, which is forfeited when attachments are applied. Besides this, every purchaser receives eighty half-hour service coupons, good for repair and adjustment work in the Union plant.



Union tractor attachment with Martin rocking fifth wheel connection to a lumber trailer

The cost of this service is defrayed by the retention of the discarded Ford parts by the Union company.

The Union attachment, while of the conventional chain-driven type, differs from others in that the Ford axle is not retained intact but is altered to adapt it to the Union installation. This alteration consists of the substitution of a special pair of axle shafts for those regularly found on the Ford, special bearings, and the reaming out of the axle housing to accommodate the larger bearings.

The Union frame extends practically the full length of the Ford frame, and is securely riveted at front and rear. There is a helper spring over the rear axle.

The tractor is practically identical with the truck attachment, except that it has a shorter wheelbase, which necessitates a special driveshaft and a shortened torsion tube. The front sprockets are also smaller, to give a lower gear ratio. The Martin rocking fifth wheel is applied to the tractor to receive the trailer.

For cash the truck unit may be bought for $350, and with the Ford chassis for $720. On time payments, which requires that 50 per cent be paid on order, the rest being paid in six monthly instalments, the attachment alone costs $365, and applied to a Ford chassis, complete, $755. The tractor costs $375 cash, including the Martin fifth wheel.

Utility Unit

Utility Motor Truck Co., Chicago

CONVENTIONAL construction is used in the Utility unit, the type being chain-driven, with the Ford rear axle serving as a jackshaft. The axle is not cut, and standard track is retained by the expedient of belling the front sprockets so that their teeth lie back over the brakes and within the space between the wheels and the frame.

The frame so telescopes the Ford frame that no alterations in the Ford are needed except to remove the rear spring and attach the jackshaft brackets to the Ford axle, to remove the rear fenders, and to connect the foot brake with the rear wheel brakes of the unit.

Woodward

Woodward Truck Attachment Co., Los Angeles, Cal.

FOR Ford and Maxwell chassis, the Woodward attachment is of the standard chain-driven type, standard tread being achieved by cutting down the length of the Ford axle, which serves as the jackshaft.

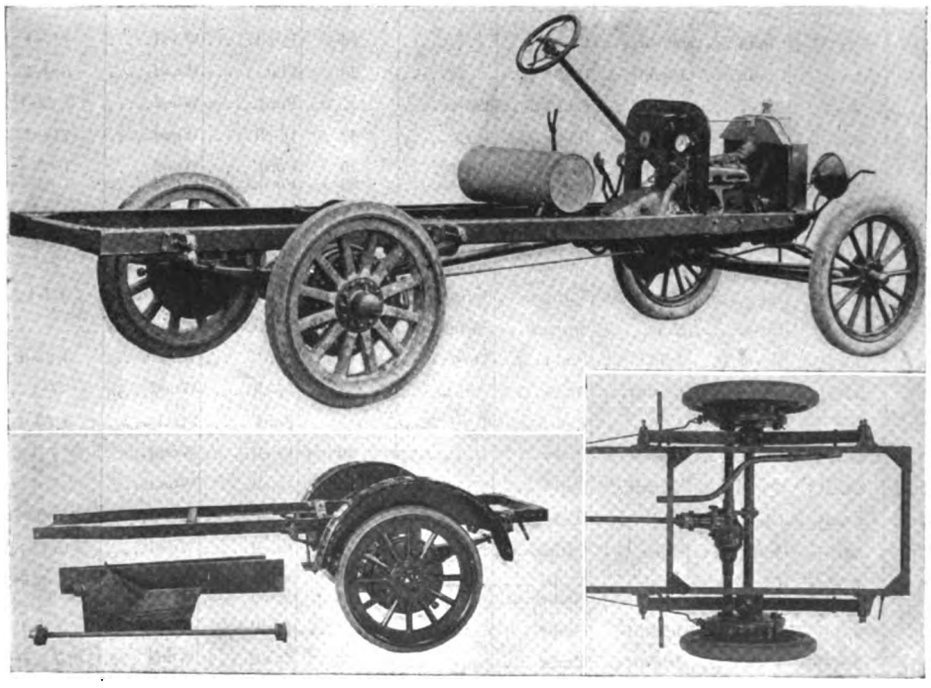
The Woodward frame extends forward to the Ford radiator and widens out at the rear. The Ford rear axle brakes are retained and hand brakes on the jackshaft, the brakes in the rear wheels being controlled by the pedal in lieu of the gearset brake, which is disconnected entirely.

Wright

Wright Truck Attachment Co., Seattle, Wash.

CONVENTIONAL as a whole, the Wright outfit nevertheless contains a number of original features. It is of the chain-driven type, employing the Ford rear axle as a jackshaft and having sprockets which attach to the axle ends interchangeably with the Ford wheels. The frame extension extends from the radiator back, widening out at the dash. In the brake system the connections between the brake lever and the internal brakes on the Ford axle are not disturbed, the brakes in the rear wheels being operated by the pedal. The Ford gearset brake is not used. Timken bearings are used in the wheel hubs.

Besides Ford adapters, Maxwells and Overlands have been converted with the Wright attachment and lumber tractors have been constructed by the Wright Co.



Shaft-driven types, above, Hudford; below, the Jewett. Note in the lower left view the complete Jewett outfit

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Shaft-driven Type

Hudford

Hudford Co., Philadelphia, Pa.

SHAFT drive by internal gears is featured by the Hudford converter, which comprises a pressed-steel auxiliary frame bolted to the Ford frame alongside the engine, from whence it flares outwardly and back, being bolted to the Ford rear cross-member at the back.

The Ford axle and spring are discarded, a Russel internal-gear-driven axle and side half-elliptics being employed instead. The Ford torsion tube and driveshaft are also dispensed with, a single tubular shaft with two universals being substituted. Either a 6-to-1 or 7-to-1 gear-ratio will be fitted.

Iowa

Iowa Motor Truck Co., Ottumwa, Iowa

TWO models of practically identical design are offered by the Iowa company. These are both internal-gear-driven, Russel axles being used. The extension frame parallels the Ford frame for its full length, widening out at the dash. The Ford axle and rear spring are discarded, together with the driveshaft, the side half-elliptics, the Russel axle and a long, tubular shaft with two universals replacing them. Torsion and propulsive stress are taken by the springs.

Kelley

Kelley Convertible Auto-Truck Co., Chicago

CHOICE of worm or internal-gear drive is offered buyers of Kelley adapters. The device is attached to a Ford, Maxwell or Chevrolet without drilling holes, and it is said that it can be detached as readily as attached. It has a pressed-steel frame that telescopes with the frame of the chassis and extends only part way forward. Variable wheelbases are also offered.

Tructor

Tructor Mfg. Co., Chicago

NO holes are drilled in the Ford frame to attach the Tructor. It is an internal-gear-driven unit, and may be applied to other makes of small cars besides the Ford. The frame is made just the right width to fit around the passenger car frame tightly so that it may be retained with clamps.

Due to this feature, it is said that the vehicle may be restored to its original form in the same time it takes to convert it for business purposes.

The entire Ford rear end is taken off in the conversion and a special driveshaft with two universals is used. The rear axle is a Celfor of the internal-gear-driven type, and the frame is of pressed steel.

Jewett

Jewett Car Co., Newark, Ohio

INTERNAL-GEAR drive is used on the Jewett adapter, which requires that the entire rear system of the Ford be discarded but provides shaft drive and inclosed working parts. The frame extension is quite similar to other adapters, attaching to the Ford frame just in front of the dash and widening out behind.

The rear axle is a Russel equipped with external brakes, with special pull-rods extending forward to the hand-lever shaft. A special shaft with two universals is used to connect the axle with the gearset, the driving stresses being taken through the springs entirely instead of by radius rods and the torsion tube, as in the Ford.

Refinements are added in the way of extended running boards of heavy pressed steel, a pressed-steel floor and footboard for the cab which is of greater width than the Ford front floor, extending the full width of the auxiliary frame, and an extension for the exhaust pipe so that it is conducted back to the rear of the vehicle.

Rayford

Rayford Co., Philadelphia, Pa.

TWO widely differing forms of adapters are made by the Rayford Co.—the first, a chain-driven type of the conventional type, and the second, an internal-gear-driven form of unique design.

This outfit uses a dead axle, similar to those on chain-driven trucks but with internal-gear rings on the wheels instead of sprockets. The Ford axle is used as a jackshaft, but instead of being bolted to the frame and driving the wheels by chains and sprockets it is bolted to the axle and drives the wheels by gear pinions meshing directly with the internal-gear rings on the wheels.

In the latter type the wheelbase is shorter than in the chain-driven type, so that there is no extension to the driveshaft or torsion tube.

The chain-driven type has the feature of standard tread, attained by the use of inward-extended sprockets on the ends of the Ford axle, these sprockets being interchangeable with Ford wheels. Rear axles on both types are of the I-beam pattern.

Specifications of Commercial Adapters for Ford Chassis

Make	Capacity in Lbs.	Price	Wheelbase, Inches	Load Platform Length in Inches	Rear Tire Size, Inches	Final Drive	Use to Which Ford Axle is Put	Propulsion by	Torque by	Overhang Back of Axle in Inches	Rear Springs	Wheel Type	Total Gear-Ratio in High Gear
Dearborn	2,000	$350	125	108	32x3½	Chain	Jckshft	Rad-r		46	½-ell	Wood	7½-1
Evans	2,000	350	135	144	32x4	Chain	Jckshft	Rad-r		38	Plat	Wood	6½-1
Forbes	1,000	100	136	.....	30x3½	Bevel	Axle	Rad-r	Tor-t	.....	Ford	Wood	3.63-1
Franklin	3,000	400	127	112	32x3½	Chain	Jckshft	Rad-r		42	½-ell	Wood	7¼-1
H-D	1,000	55	115	.....	30x3½	Bevel	Axle	Rad-r	Tor-t	20	Ford	Wood	3.63-1
H-D	1,000	60	130	90	30x3½	Bevel	Axle	Rad-r	Tor-t	20	Ford	Wood	3.63-1
Hudford	2,000	325	122	.....	32x3	Int-g	None	Springs	Springs	.....	½-ell	Wood	6-1 or 7-1
Iowa	2,000	375	116	108	32x3½	Int-g	None	Springs	Springs	24	½-ell	Wood	7-1
Iowa	3,000	450	116	108	32x3½	Int-g	None	Springs	Springs	24	½-ell	Wood	7-1
Jewett	2,000	375	118	102	34x3½	Int-g	None	Springs	Springs	38¼	½-ell	Wood	7.4-1
Kelley	3,000	365	127	108	32x3½	Int-g	None	Springs	Springs	.....	½-ell	Wood	.....
Longford	.....	.....	136	.....	30x3½	Bevel	Axle	Rad-r	Tor-t	.....	Ford	Wood	3.63-1
Maxfer	2,000	350	125	132	32x3½	Chain	Jckshft	Rad-r		23	½-ell	Wood	7-1
Olson	2,000	105	100	72	Opt...	Bevel	Axle	Rad-r	Tor-t	None	Ford	Steel	3.63-1
Rayford	2,000	300	124	96	32x3½	Chain*	Jckshft	Rad-r		38	½-ell	Wood	7-1
Redden	2,000	350	132	120	34x3½	Chain	Jckshft	Rad-r		22½	½-ell	Wood	7-1
Smith	2,000	350	125	108	32x3½	Chain	Jckshft	Rad-r		48	½-ell	Wood	7 5/11-1
Tructor	3,000	350	127	120	32x3½	Int-g	None	Springs	Springs	24	½-ell	Wood	6 to 7½-1
Union	3,000	350	125-150	168	32x3½	Chain	Jckshft	Rad-r		42	½-ell	Wood	7-1 or 9-1
Union-Tractor	6,000	375	110	.....	32x3½	Chain	Jckshft	Rad-r		24	½-ell	Wood	9-1
Utility	2,000	350	125	132	32x3½	Chain	Jckshft	Rad-r		.....	½-ell	Wood	7.1-1
Woodward	2,500	350	126	96	32x3½	Chain	Jckshft	Rad-r		36	½-ell	Wood	6, 7 & 8-1
Wright	2,000	350	122	96	32x3½*	Chain	Jckshft	Rad-r		38	½-ell	Wood	7-1

*Also made in internal-gear-drive form.

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Devoted to topics pertinent to commercial vehicle operation design and maintenance. Open to the use of all readers. Communications must be accompanied by the sender's name and address, confidential if preferred. No charge is ever made for this service.

PLATTSBURGH TANK AUTOCARS

Four Vehicles at Training Camp Carry Tanks Themselves

To the Editor, COMMERCIAL VEHICLE:

I have heard that the Autocar Co. has one of its 2-ton trucks at the Plattsburgh military training camp and that it is being used to haul a tank wagon. Will you please give me the following data relative to its use through The Readers' Forum?

1—Weight of Autocar chassis.
2—Weight of load.
3—Weight of tank wagon.
4—Weight of load.
5—Is the operation of the truck with the tank wagon successful?
6—What per cent of grade can this outfit make on a fair road?
7—At what speed does the outfit travel?
8—Is the truck of special design, or does it have special gearing?
9—Would you consider it good practice to use this kind of outfit in regular lines of business?—J. H. LYTE, Philadelphia, Pa.

The Autocar tank trucks at Plattsburgh are four in number, and they all have their tanks mounted directly on their frames. They do not haul tank wagons. To answer the queries in the order given:

1—Forty-five hundred pounds.
2—Four hundred and fifty gallons of water; roughly, 3600 lb.
3—None used.
4—None used.
5—Not so operated. Use of tank on truck quite satisfactory.
6—Depends on road. On a good pavement the trucks could negotiate a 25 per cent grade.
7—Also depends on road. On a good road the trucks could make from 18 to 20 miles per hour.
8—The trucks are stock Autocar chassis, except that they are equipped with Gould gear pumps, driven from their gearsets, to pump the water into the tanks.
9—Such trucks are regularly used by the large oil companies and are eminently satisfactory.

TWO-CYLINDER OPPOSED MOTORS

Six Truck Makers Use Horizontal Type of Engine To-day

To the Editor, COMMERCIAL VEHICLE:

Will you please furnish me at your earliest convenience a list of the concerns using two-cylinder opposed motors and, if possible, the manufacturers of these power plants?—J. E. S., New York City.

Of motor trucks on the market to-day, six makers are using two-cylinder opposed motors. These are:

The Autocar Co., Ardmore, Pa.
Geneva Wagon Co., Geneva, N. Y.
International Harvester Co., Akron, Ohio.
Stewart Iron Works Co., Covington, Ky.
Brasie Motor Car Co., Minneapolis, Minn.

In each case, it is believed, the engine is manufactured by the builder of the truck.

SNOW PLOW FOR PAPER TRUCK

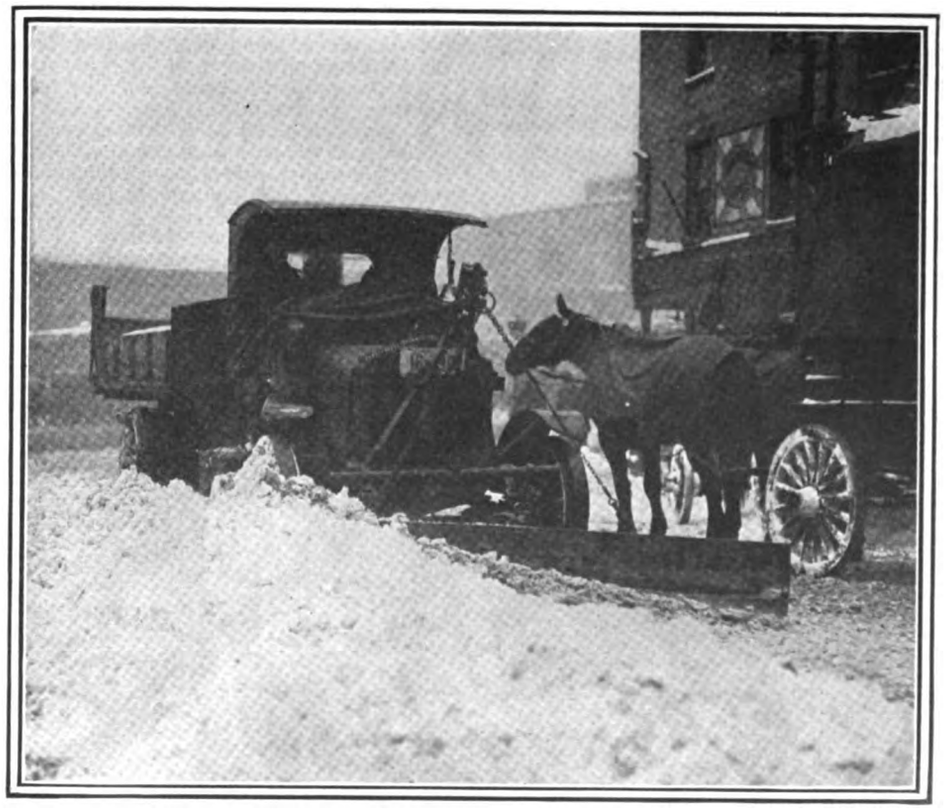
New York Concern Has Developed Type for Easy Application

To the Editor, COMMERCIAL VEHICLE:

Kindly advise us of any manufacturer making snow plows suitable to be placed on a Pierce-Arrow 5-ton truck. As most of our trucking is done on dirt roads, it would be necessary to have one which we could raise and lower very readily.—W. P. FRANCISCO, purchasing agent, Mountain Mill Paper Co., Lee, Mass.

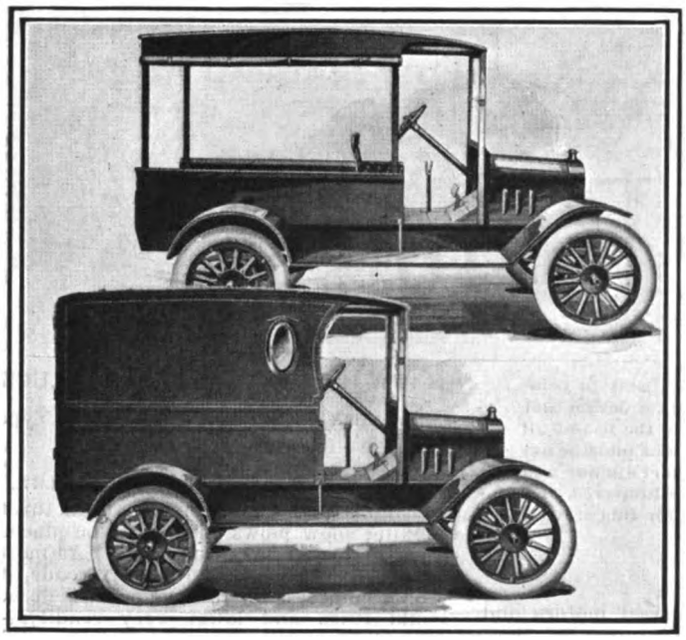
Such a plow has been developed by the Good Roads Machinery Co., New York City, for the Department of Street Cleaning of New York. This plow may be attached in a short time to any make of truck and, similarly, removed quickly. It does not injure the vehicle in any way, and when installed is fitted with a wheel control by which it may be raised and lowered quickly by an operator at the driver's side.

These plows require about 1 hr. labor to install. They weigh 500 lb. complete and cost $135.



Good Roads snow plow attached to Pierce-Arrow 5-tonner

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Above, the Corliss ½-tonner with the express type of body.

Below, steel panel body applied to Corliss all-steel chassis

Corliss 1,000-pounder is Light in Weight

Unit Body and Chassis, All Metal

PRESSED steel construction throughout is used in the new Corliss light delivery truck, this vehicle being constructed entirely of steel, with the body forming what is practically an integral part of the chassis. It is produced by the Corliss Motor Truck Co., Corliss, Wis.

There are two body models, an express type with a fixed top at $650 and a panel type at $690, both made entirely of steel. Another new feature of the Corliss vehicle is the use of running-board boxes, at a slight additional cost, in which light parcels may be carried, thus making them especially accessible and increasing the cubical load capacity of the vehicle.

The engine is located beneath a small hood in front, and with the clutch and gearset constitutes a unit power plant suspended on three points. It is cast in block. No governor is fitted.

The gearset is of the three-speed selective type, and final drive is through a shaft with two universals to the three-quarter-floating rear axle. The springs take the torque and propulsion, and elliptic springs are employed.

Wheels are of wood, with pneumatic tires on quick-detachable rims. The truck is said to be very light in weight owing to the steel construction.

SPECIFICATIONS

Capacity	1,000 lbs.
Price	$650
Wheelbase	100 in.
Tire—Front	31 x 4
Rear	31 x 4
Bore	3¼
Stroke	4½
N. A. C. C. hp.	15.64
Speed—r.p.m	1250
m.p.h.	25
Gear-ratio in high gear	4¼-1
Final drive	Bevel

Fostoria ½-tonner at $695 Has Complete Equipment

ONE commercial model is produced by the Fostoria Light Car Co., Fostoria, Ohio, the chassis being essentially the same as that used for the Fostoria light passenger car, and provided with two types of body. These are a light express model with a permanent top and a full panel job. The price of $695 for the former is one of the interesting features of this product.

In design the chassis follows standard lines, embodying such features as a valve-in-head motor, electric starting and lighting, demountable rims and cantilever rear springs.

The Sterling motor is incorporated with the clutch and gearset to form a three-point-suspended unit powerplant and is located under a louvred streamline hood. Its four cylinders are cast in block and the crankshaft runs on two bearings. Valves are contained in the separately-cast head and their mechanisms are inclosed. Water circulation is by thermo-syphoning through the Fedders cellular radiator.

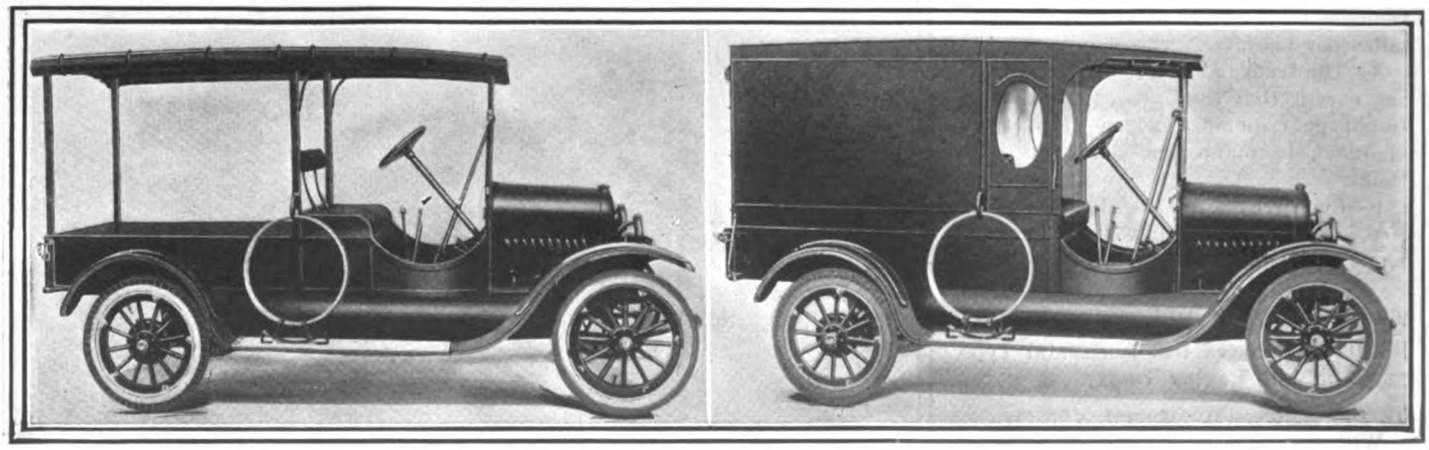
Gasoline is fed to the Zenith carbureter by the Stewart vacuum system from a tank at the rear of the chassis. A Remy battery system of ignition is employed, the current being drawn from the Willard battery used in connection with the Allis-Chalmers starting and lighting system.

A dry-disk clutch and three-speed selective gearset, both made by the Detroit Gear Company, drives the Adams axle through a torque-tube-inclosed shaft with one universal.

Standard equipment consists of the usual five lamps, tools and electric horn in addition to which there is a ventilating and rain-vision windshield, a speedometer and a spare rim.

SPECIFICATIONS

Capacity, lbs.	1,000
Price, express body	$695
Wheelbase, in.	108
Tires, front	30 x 3½
rear	30 x 3½
Bore	3
Stroke	4¼
N. A. C. C. hp.	14.40
Final drive	bevel



Fostoria 1000-pound chassis with two standard body types applied, left the express type, and right the panel

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Denmo, a New 1¼-tonner a Refined Model

Design Follows Standard Practice

REFINEMENT of standard ideas in truck construction has been the aim in building the Denmo 1¼-tonner. This is a new truck just announced by the Denneen Motor Co., Cleveland, Ohio, after more than a year of experiment and practical road testing. Outstanding features of the Denmo vehicle are its electric starting and lighting, internal-gear drive, the combination of pneumatic front tires with solid rears, and a governor actuated by the speed of the vehicle instead of by that of the engine.

In installing the electric system the weakest part of any truck electric system, the storage battery, has been given especial attention, with the result that a spring cradle has been devised to protect it from road shock.

Unit powerplant construction is employed, the Wisconsin engine being incorporated with the clutch and gearbox. The engine is cast in block, with valves to the left. In casting the engine great compactness has been achieved. The crankcase is of aluminum, and carries three crankshaft bearings. The entire power plant is suspended on three points.

Thermo-syphon water circulation cools the engine, the radiator being of the Fedders cellular type, incased in sheet metal and mounted on a steel cradle, spring-mounted. This cradle extends across the bottom of the radiator so that there is no tendency for it to sag, the springs being flat ones, looped forward.

Gravity gasoline feed supplies the Stewart carbureter, and a short connection from a stove on the exhaust header furnishes hot air. The carbureter is mounted high enough to secure a short passage to the valves. The governor is a Pierce, driven by flexible shaft from behind the gearbox instead of from the motor, this drive limiting the truck speed only and having no effect on the motor otherwise. Thus the full power of the motor is available on the lower gears.

Although an electric system is used for starting and lighting, ignition is supplied entirely separate by a Dixie magneto. The Splitdorf-Apple two-unit lighting and starting system is used, both units being mounted on the left side of the engine and the battery on a spring cradle.

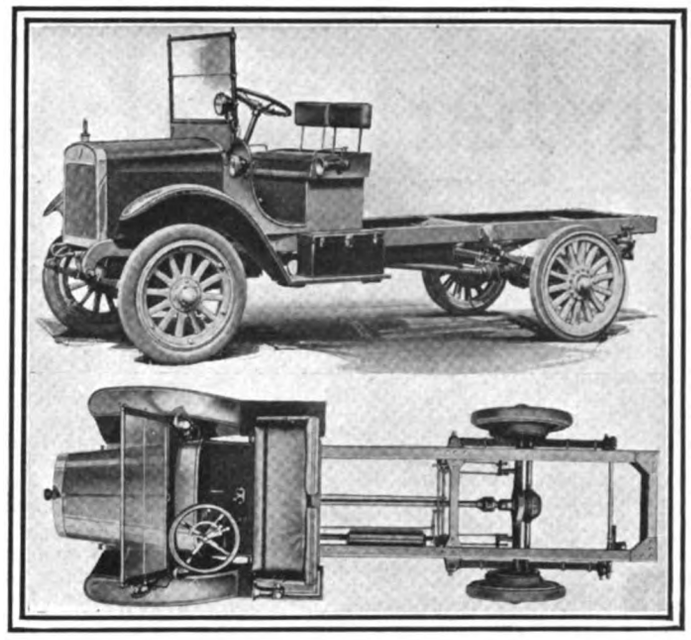
In the lubrication system of this motor especial pains have been taken. Pure pressure lubrication is used, a gear pump forcing the oil from the reservoir to the helical timing gears and over the bearings.

Driving the three-speed selective gearset is a Borg & Beck dry-plate clutch, from which the drive is taken on an approximately straight line, thanks to the tilting of the motor, to the Torbensen internal-gear-driven rear axle. Brakes on this axle are external and internal, the latter being foot-operated and the latter actuated by the hand lever.

Steel-felloe wheels are used, the front ones having 34 x 4½ pneumatic tires and the rear ones 34 x 4 solids. The front rims are demountable, the rear tires being pressed on.

The Hotchkiss driving principle is followed, the master leaves of the rear springs being made of vanadium steel for this purpose, the other leaves being of carbon steel, heat-treated. The frame is of pressed steel of uniform section, front spring horns being integral. The radiator is carried well forward of the axle to shorten the wheelbase and still allow a generous length of load platform, and this construction affords a turning circle of 42 ft.

The equipment of the Denmo chassis is complete, comprising a steel battery box on one running-board, a hand horn, side and tail lamps, a swiveled spotlight, a ventilating and rain-vision windshield, a bumper, speedometer, motometer, spare rim and tools.

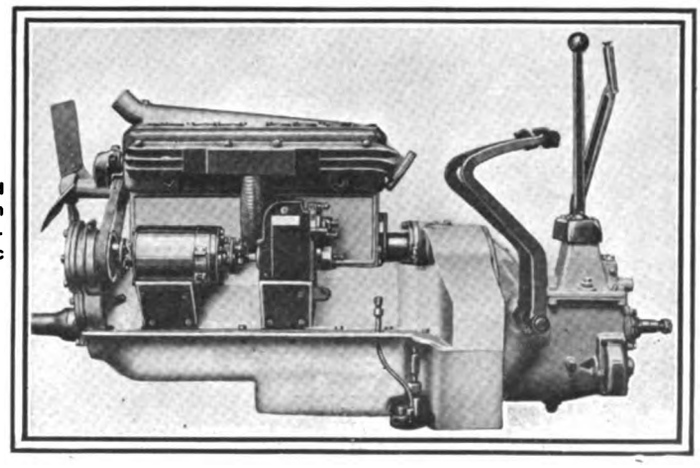


Above, the Denmo 1¼-ton chassis, showing its general appearance

Below, overhead view of Denmo chassis, showing internal-gear rear axle

SPECIFICATIONS

Capacity	2,500 lbs.
Price	$1,385
Wheelbase	124
Tires—Front	34 x 4½
Rear	34 x 4
Bore	3¾
Stroke	5
N. A. C. C. hp.	22.50
Speed—M.p.h.	20
Final drive	Internal gear



Unit powerplant used on Denmo 1¼-ton chassis, showing installation of electric units

"Tariff Systems of South American Countries." Tariff Series No. 34 is the title of a new booklet just issued by the Bureau of Foreign and Domestic Commerce, Washington, D. C., that covers exhaustively all the obscure points of South American tariffs, with their fines and penalties. The book is designed primarily to aid American exporters who are desirous of entering the South American field. It is written by Dr. Frank R. Rutter, assistant chief of the Bureau of Foreign and Domestic Commerce and formerly chief of the Tariff Division of the bureau, who visited the capitals and principal ports in South America and studied carefully the actual administration of tariff laws before undertaking the writing of the new report. The booklet is not merely a compilation of tariff schedules, but is concerned primarily with the actual application of the tariff laws, with the underlying sentiment expressed in them and the spirit in which such laws are administered and for these reasons should prove of great value to all those who seek to enter the South American export field. The report may be obtained from the superintendent of documents, Washington, D. C., or from any of the district officers of the Bureau of Foreign and Domestic Commerce throughout the United States.

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Men and Makers



REO MOTOR TRUCK CO., Lansing, Mich., has vacated the former plant in which Reo trucks were built and now occupies a new plant, covering 5 acres and costing $250,000. The new plant is entirely separate from that of the Reo Motor Car Co., the truck department of the business, as before, being run entirely separate and under a different name. The abandoned quarters have been occupied by the Reo Motor Truck Co. since its inception as a separate unit 5 years ago.

The new home has 200,000 sq. ft. of floor space.

Acason Motor Truck Co., Detroit, Mich., has moved to its new factory at 429 Brooklyn Street, Detroit, having outgrown two smaller plants within the year.

Bell Motor Car Co., York, Pa., is planning a one-story addition to its plant 108 by 240 ft.

Milburn Wagon Co. has closed a lease for a large plant at 1104 Summit Street, formerly occupied by the Toledo Bending Wks. The new plant will be used for the wagon department, enlarging the space in the present plant for the manufacture of electrics.

The company will also use a portion of the acquired building for the manufacture of standard motor vehicle bodies. Emil J. Seeman will be manager of the branch.

L. J. Ollier, vice-president and director of the Studebaker Corp., Detroit, has returned from a circuit of Studebaker dealer conventions in thirty-five leading cities of the country. These conventions are held instead of the usual annual factory convention, because, with a dealer force of 6500 men, such a convention is too big to be effectual or economical.

Mr. Ollier reports prosperity everywhere, especially among the farmers. The wheat crop, while smaller than last year, will yield an even higher return, states Mr. Ollier, because of the high prices being paid and because there have been no total losses of crops.

Henry T. Myers, commercial vehicle sales manager of the Studebaker Corp., Detroit, has just returned from a strenuous circuit of sales conventions. More than 6000 miles in the West and Middle West have been covered by Mr. Myers in 2 months, all but 7 nights being spent in sleepers. Mr. Myers' sole purpose was to interest Studebaker dealers in the commercial line at the various sectional conventions held throughout the West.

He stated on his return that there is a great awakening among both dealers and merchants as to the advantages of delivery trucks, both as marketable goods and money-making investments. Double the number of sales of commercial Studebakers have been made over those of a year ago.

A. B. Hanson, formerly general manager of the Service Motor Truck Co., Wabash, Ind., has accepted the position of vice-president and general manager of the Detroit Commercial Car Co., Detroit, Mich.

A. C. Leverton has been made production manager of the Briscoe Motor Corp., Jackson, Mich. Mr. Leverton was formerly general manager of the Chalmers Motor Co., works manager of the Carter Car Co., and general superintendent of the Brush company.

Hal. T. Boulden has resigned as general sales manager, advertising manager and associate executive of the Chase Motor Truck Co., Syracuse, N. Y., and Sept. 1 will accept the position of sales director of the Selden Truck Sales Co., Rochester, N. Y. Mr. Boulden is widely known in the truck field, having been general manager of the Service Recorder Co., Cleveland, Ohio, prior to his connection with the Chase company.

B. E. Blackley will succeed H. T. Boulden as sales manager of the Chase Motor Truck Co. on Sept. 1. Mr. Blackley has been acting as Mr. Boulden's assistant for some time past. R. H. Salmons will continue as secretary and will also have charge of the growing export business of the Chase company.

Forest J. Alvin has been made general sales manager of the United States Motor Truck Co., Covington, Ky. Until the Elgin Motor Car Corp. bought out the New Era Engineering Co., Joliet, Ill., Mr. Alvin was its president and general manager. Like so many of those prominent in the motor vehicle business, Mr. Alvin is a graduate of the bicycle business.

The appointment of Mr. Alvin took place Aug. 15 as one of the first steps in the expansive plans of the company, which recently increased its capital from $300,000 to $1,000,000.

Cecil Hamelin Taylor, consulting engineer for the Republic Motor Truck Co., Alma, Mich., and also for the Curtiss Aeroplane Co., Hammondsport, N. Y., sailed recently for an observation tour through England and France.

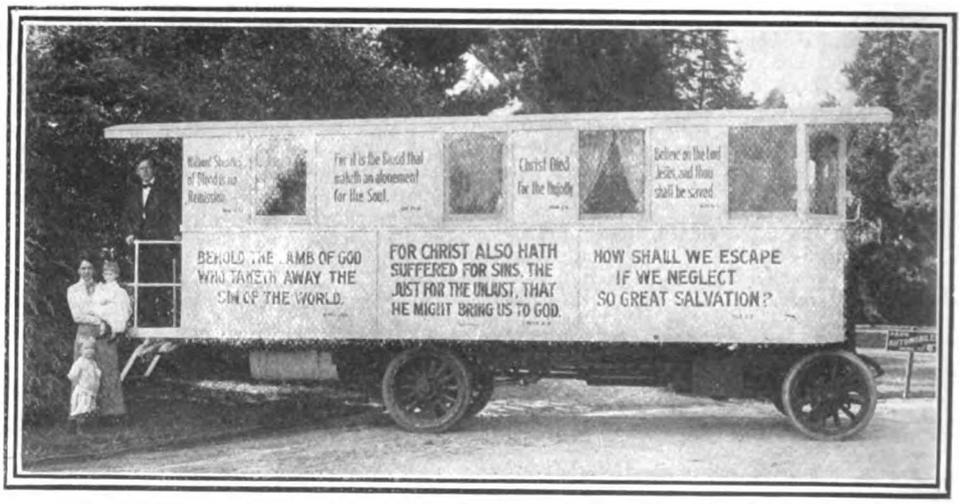
Mr. Taylor's object will be the study of aeronautical motors among the warring nations, and he will incidentally bring back some truck observations from the front.

Fred A. Wade has been appointed to succeed J. T. Wilson as purchasing agent of the Buick Motor Co. Mr. Wilson has resigned. Mr. Wade was previously purchasing agent of the Maxwell Motor Co. and has been connected with the Studebaker, E-M-F and Ford organizations.

H. J. Copeland has become purchasing agent for the Federal Motor Truck Co., Detroit, leaving a similar position which he held for 2 years with the Hudson Motor Car Co.

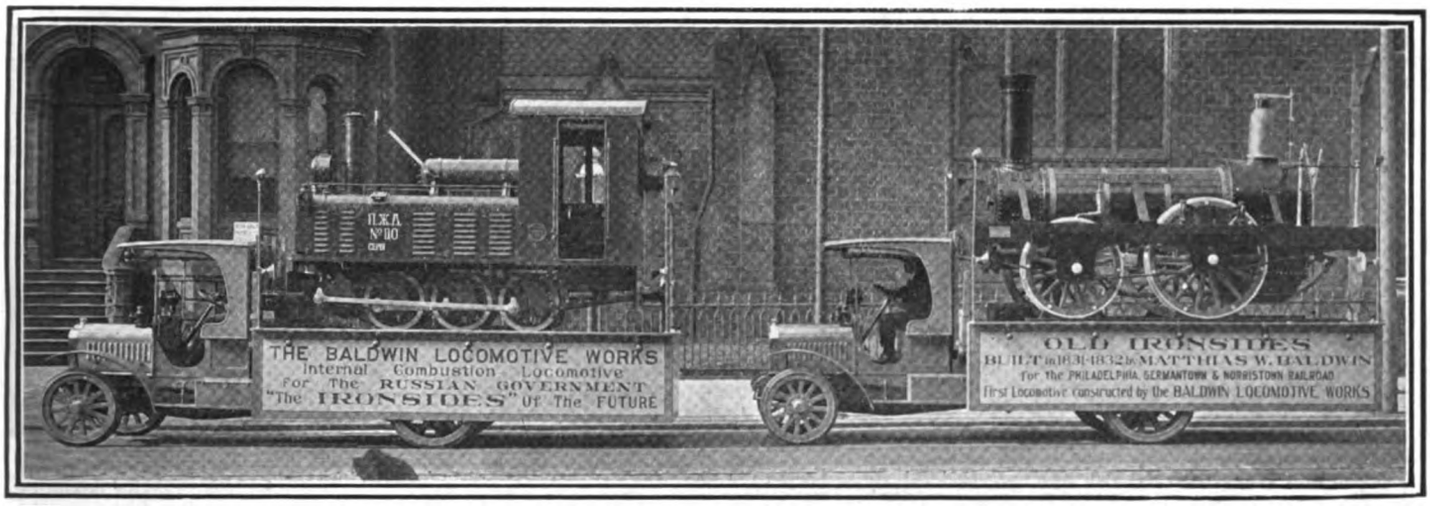
O. C. Wise, after spending several days at the plant of the Reo Motor Truck Co., Lansing, Mich., has been sent to Havana to manage the branch of Gaston, Williams & Wigmore in that city, where he will distribute Reo trucks.

Edward P. Strang, formerly with the Kirk-Latty Mfg. Co., Cleveland, Ohio, has become Middle Western sales manager for the Deneen Motors Co., Cleveland.



Nels Thompson, a Western evangelist, who says he used to follow the race tracks before he became converted, is crossing the country in the uniquely-bodied truck shown in the illustration. Thompson has with him his wife and two children. Eventually they expect to ship the truck to Sweden and work there. After paying for the truck Thompson stated he had very little money left. He will be entirely self-suporting on the cross-country tour he is now making. He says simply that he runs the car and preaches and trusts to God for money. He worked for a few days in San Diego and started from there the middle of August for his long jaunt across the continent. He does all his preaching from the platform of the truck that is equipped for his home with the necessary furniture for sleeping, cooking, etc. A distillate range is inside the truck and they draw fuel for it from the same tank which feeds the engine. Whey they get out of the distillate region in the western country they expect to use tops, a fairly good grade of which can be burned in the Moreland truck instead of distillate. The chassis is a 2½ ton Moreland worm drive, made in Los Angeles. The body is 16 by 8½ ft. Mr. Thompson drives the truck himself, and expects to do his own repairing

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During the recent convention of the Associated Advertising Clubs of the World, held in Philadelphia, the Baldwin Locomotive Works exhibited the two floats above pictured. They showed the first and the latest products of the Baldwin company, mounted on Saurer chassis, of which the Baldwin company has many. A remarkable thing about the exhibit is that the latest product is of about the same size, weight, and power as its ancient ancestor, being one of the new gasoline locomotives being built for the Russian government

Alvan T. Fuller Co., Boston, Mass., Packard distributor for New England, has commenced work on the new service station on Commonwealth Avenue. The new building, when complete, will be the largest building in the world devoted to the business of an individual dealer in motor trucks and cars and will cost, it is said, $600,000.

It will be in the nature of an addition to the present structure, increasing the floor space 160,000 sq. ft., making a total of 185,000.

The first floor will be used as a salesroom for used cars and rebuilt Packards; the second floor as a salesroom for Packard trucks, and the third and fourth floors will be devoted to delivery of new cars and trucks. The first floor of the rear wing that will connect the two buildings will be turned into a truck repair shop, the second floor for additional body storage and the two upper floors as extensions of the present paint and mechanical shops.

When Mr. Fuller built his present structure 6 years ago and moved 3 miles away from the motor section of Boston, the plant was named Fuller's Folly. But at that time he was wise enough to buy a large plot of land, so that there was room for the new extension without having to purchase any more. The land has trebled in value, owing to other motor plants being erected on the avenue. In the 6 years he has been out there, more than twenty-five motor buildings have joined the Commonwealth Avenue-Beacon Street section.

Mr. Fuller controls the Portland, Me., Manchester, N. H., Worcester, Mass., Providence, R. I., and Boston territories for the Packard. Yet despite his enormous business, which has brought him millions from a start with a few dollars, he has time for other activities. He was elected to the State Legislature from Malden, Mass., as a Progressive 2 years ago; went to the Progressive convention at Chicago as a delegate, and he is now treasurer of the big Billy Sunday campaign movement that opens next fall at Boston.

Denby Motor Truck Co., Detroit, Mich., has opened a branch in Des Moines, Iowa, in charge of C. F. Morphew.

Hartwell Motor Co. has been organized in Los Angeles, Cal., to distribute the Jeffery line, and temporary quarters have been opened at 1242-44 south Flower Street, where the service and sales departments will operate until a new building is completed, to be located in the same block.

At the head of the concern is **J. E. Ransford**, president. Ione J. Ransford is vice-president, J. L. Olsen is secretary and F. A. Hartwell, treasurer and general manager. F. M. Randall, who for many years was identified with the Maxwell and the Buick in Washington, is to head the car sales force, and it is reported here that T. L. Grabem of Chicago, who has been identified with the Master carbureter interests there, and George Valerius of Salt Lake, who formerly traveled the Western district for the Haynes, will also become affiliated with the Jeffery distributors.

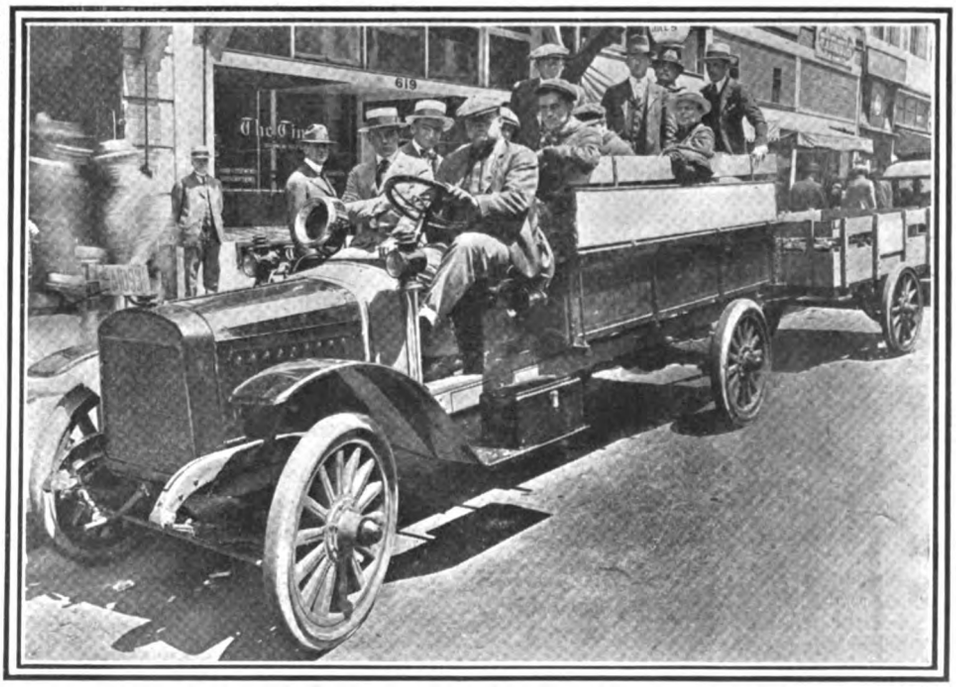
Garford-Toledo Motor Truck Co. has been formed for the distribution of Garford trucks in northwestern Ohio. The company began operations Aug. 15, with A. H. G. Jenssen in charge as manager. The salesrooms and service station are located at 214 Huron Street. Arrangements will be made for representation in every important city and town in the territory.

S. B. Howard has been appointed New England sales manager for the Deneen Motor Co., Cleveland, Ohio, builder of the new Denmo truck. Mr. Howard was formerly eastern and foreign representative of the General Motors Co.

David C. Ahearn, formerly identified with the business department of the Boston Globe, has joined the sales force of the Vim Truck Co. at Boston, Mass.

Herschell-Spillman Co., North Tonawanda, N. Y., producer of Herschell-Spillman motors, is building an addition to its plant to permit of increased production. The addition is of the latest type of reinforced concrete factory structure.

Covert Gear Co., Inc., formerly the Covert Motor Vehicle Co., Lockport, N. Y., has completed a new factory building and has partially installed the machinery and has started on two more additions,



Republic truck donated by D. F. Poyer, the Los Angeles agent for the maker, to the service of the citizen's training camp at Monterey, Cal. It carried fourteen recruits and hauled their baggage on the trailer behind. The trailer is the product of the new Los Angeles Trailer Co.

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thus preparing for the expansion provided for by the increase in capital to $1,000,000.

It has also announced a new unit power plant type of selective gearbox for 1000-lb. light delivery vehicles.

The change of company name is due to the fact that the Covert car, one of the first shaft-driven types built in this country, has not been built for a number of years, the concern devoting itself entirely to the production of gearsets.

Sewell Cushion Wheel Co., Detroit, Mich., has established a branch in Pittsburgh, in the charge of E. G. Burley. This is the thirteenth branch which the Sewell company has opened, the others being in New York, Chicago, Philadelphia, Buffalo, St. Louis, Boston, Cleveland, Minneapolis, Rochester, Baltimore, Seattle and Los Angeles. The new Pittsburgh branch will serve western Pennsylvania, eastern Ohio, western Maryland and northern West Virginia.

D. G. Rockwell has taken the Detroit agency for the Tonford adapter for Ford chassis, having formerly been Polack tire agent in Detroit and previous to that connected with the solid tire department of the Goodyear Tire & Rubber Co., Akron, Ohio.

John L. Judd, New England distributor for the Smith Form-A-Truck Co., has moved from Massachusetts Avenue to Beacon Street, where a new building has been finished for his line, which also includes the Auburn and Allen.

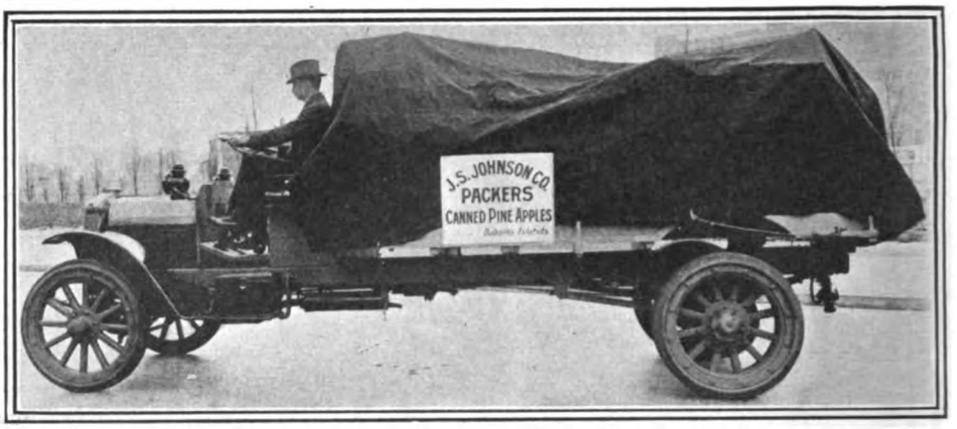
Gustaf Peterson, formerly sales engineer for the alloy steel department of the Carnegie Steel Co., has been made vice-president and works manager of the Alloy Steel Spring & Axle Co., Jackson, Mich.

H. E. Merrithew, formerly vice-president of the O. & M. Supply Co., Kansas City, has been made district manager in that territory for the Findeisen & Kropf Co., maker of Rayfield carbureters.

Raymond S. Willis has received the appointment as purchasing agent for the United States Rubber Co., New York City.

Welfare work recently inaugurated by the A. O. Smith Co., Milwaukee, Wis., includes free insurance and educational motion pictures for employees. The insurance plan gives each employee life insurance without cost. His insurance starts after he has been employed for 1 year, after which it increases with each year of service, until it reaches $1,000. The entire cost is borne by the company. The motion pictures are shown in the main bay of the principal room of the shop every Monday and Friday noon.

Bodies for coal delivery as fitted to Sterling chassis are interestingly described and illustrated in a new folder issued by the Sterling Motor Truck Co., Milwaukee, Wis. This folder, characteristic of much of the Sterling literature, is a big folded affair, printed in bold type in big letters, and contains much valuable data and little fluff. It describes hydraulic and mechanical end-dump bodies, screw and bell-crank elevating types, and the Lee side-dump coal bodies, as well as the usual description of the Sterling chassis in worm and chain-driven form.



Said to be the only motor truck in the Bahama Islands, the 2-ton Federal shown above is rendering good service in the haulage of pineapples from a large plantation on the island of New Providence to Nassau, the main city on that island, 6 miles distant. As shown, the truck is equipped with a conventional low-sided box body. The pineapples are packed in crates and are protected while in transit by means of a tarpaulin cover

Uncle Sam's Example in using trucks in the military operations on the border has given truck sales a decided boost in the Southwest territory, according to Arthur H. Hertz, field manager of the Moreland Motor Truck Co., Los Angeles, Cal., who has just returned from a trip through Texas and Arizona.

"Reo Truck News" is the new house organ of the Reo Motor Truck Co., Lansing, Mich., the first number of which is dated June, 1916, although not received in New York until Aug. 21. The little book has 8 pages of standard 9 by 12 size, printed in legible type and well illustrated with half-tone engravings. Page numbering is unfortunately omitted, but otherwise there is nothing but praise to be given for the good taste displayed in both make-up and the tenor of the subject matter. The articles in the first issue deal mainly with interesting examples of experiences of users of Reo truck fleets, factory brevities, editorials, and a leading article on the new extensions to the Reo plant.

Pulling trains of passenger cars, two Moreland trucks capped the climax of the Los Angeles *Examiner's* circulation contest. The cars, twenty-five in all, were prizes awarded the winners of the circulation contest conducted by that paper, and represented a variety of makes, such as Packard, Mercer, Stutz, White, etc. On the last day of the contest the twenty-five cars were joined with ropes and pulled through the principal streets by a new Moreland truck, bearing a banner with the legend, "The locomotive of the western highways." Later the train was divided, the first thirteen being pulled by the first Moreland and the remaining twelve by another of the same make.

No trouble was experienced in taking corners or negotiating dense traffic and steep hills, each car having a man to attend to the steering and brakes. At one stage of the parade the cars made a complete loop about the block-square Examiner Building.

Carburetion is the title of a new book recently published by the Master Carbureter Co., Detroit, Mich. The work is from the pen of Raymond M. Anderson and is useful as a treatise on the principles of carburetion.

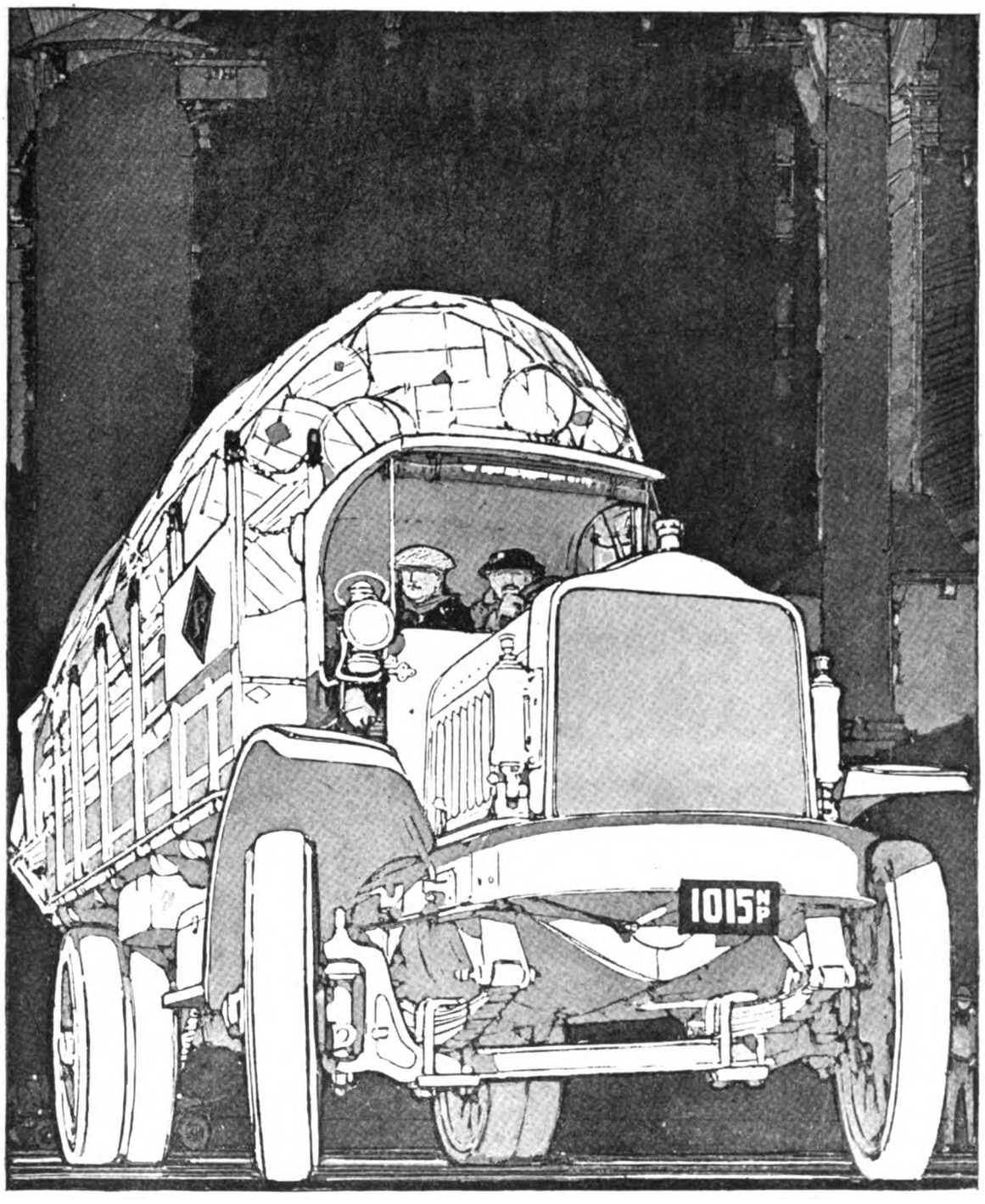
"Road Construction and Maintenance" is a new book published for gratis distribution by the E. I. du Pont de Nemours Powder Co., Wilmington, Del. It is a general treatise on road location, grade-finding, engineering and construction, covering practically all types of surface and work under all sorts of conditions. Especially useful are the portions which deal with the use of explosives in road work. Every road builder or person who makes a study of road construction and maintenance should have a copy of this work.

Use big enough cord tires if you would have good success with them, warns L. C. Rockhill, manager of the pneumatic tire department of the Goodyear Tire & Rubber Co., Akron, Ohio. Goodyear cords are larger than fabric tires of the same rated size and capacity and many users imagine that they are oversized, applying regular-sized cords in place of oversized regular tires. This is a mistake as, to be economical, cords must be more durable than fabric types to justify their higher price. They are built oversize to give this durability and for superior ease of riding made possible by the decrease of 10 lb. in required pressure.

Commercial Vehicle Agencies Recently Established Throughout the Country

Springfield, Mass.	Autocar	Stoddard Motor Car Co.
Albany, Wis.	Kisselkar	R. H. Dorn
Camas, Wash.	Kisselkar	Stoller Motor Co.
Dubuque, Iowa	Kisselkar	Scheppele Machine Works
Frankfort, Ky.	Kisselkar	E. C. Nell
Grafton, W. Va.	Kisselkar	W. S. & A. C. Phillips
Hartford, Conn.	Kisselkar	D. A. Thrall
Lynn, Mass.	Kisselkar	Ruth-Hartwell Co.
Monongahela, Pa.	Kisselkar	Ben. F. Forsyth
Pocatello, Idaho	Kisselkar	Branen-Kingsbury Motor Co.
Plainfield, N. J.	Kisselkar	Laing Machine-Auto & Repair Co.
Port Jervis, N. Y.	Kisselkar	Port Jervis Auto Co., Inc.
Pocahontas, Va.	Kisselkar	Southwest Motor Car Co., Inc.
Redlands, Cal.	Kisselkar	Glen J. Milligan
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SCORES and scores of White Truck owners have driven their trucks a hundred thousand miles and more. We have letters on file from more than a hundred of these owners whose White Trucks now exceed that mileage and are still in excellent condition. (Facsimile copies of these letters will be mailed to anyone interested.)

So far mileage has been limited only by time and by the possibilities of trucking operation.

No White Truck has ever worn out in commercial service

THE WHITE COMPANY
CLEVELAND

PLEASE MENTION THE COMMERCIAL VEHICLE WHEN WRITING TO ADVERTISERS

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Truck Owners, Operators, Manufacturers, Dealers and Agents—Grasp Your

OPPORTUNITY

If the threatened RAILROAD STRIKE goes into effect, the motor truck will be offered one of the greatest OPPORTUNITIES it has ever had. If the railroad systems are only partially paralyzed, motor trucks will be the most available means of transporting the vitally-necessary food products into the cities and the haulage of all classes of goods between cities and towns.

Here is the OPPORTUNITY for trucks to get a further foothold in the inter-city freight haulage. It is an OPPORTUNITY—an IMPETUS for the increased sale of trucks unequalled even by the satisfactory work which trucks have accomplished in the foreign war.

Every eye will be upon the truck in this work for everyone must eat and everyone will be interested in how to get food.

Even if the strike is short-lived, the OPPORTUNITY for supplanting the railroads for short-haul traffic is of the greatest importance, for many of the trucks will undoubtedly remain in the service. What are now considered long hauls may to-morrow be short hauls.

The OPPORTUNITY of getting large numbers of trucks into this work is open to owners, operators, manufacturers, dealers and agents. Grasp this OPPORTUNITY. List your trucks available for this work. Make this list known to those in need through your local press or by other means.

THE COMMERCIAL VEHICLE has taken the lead in aiding in this work by establishing a

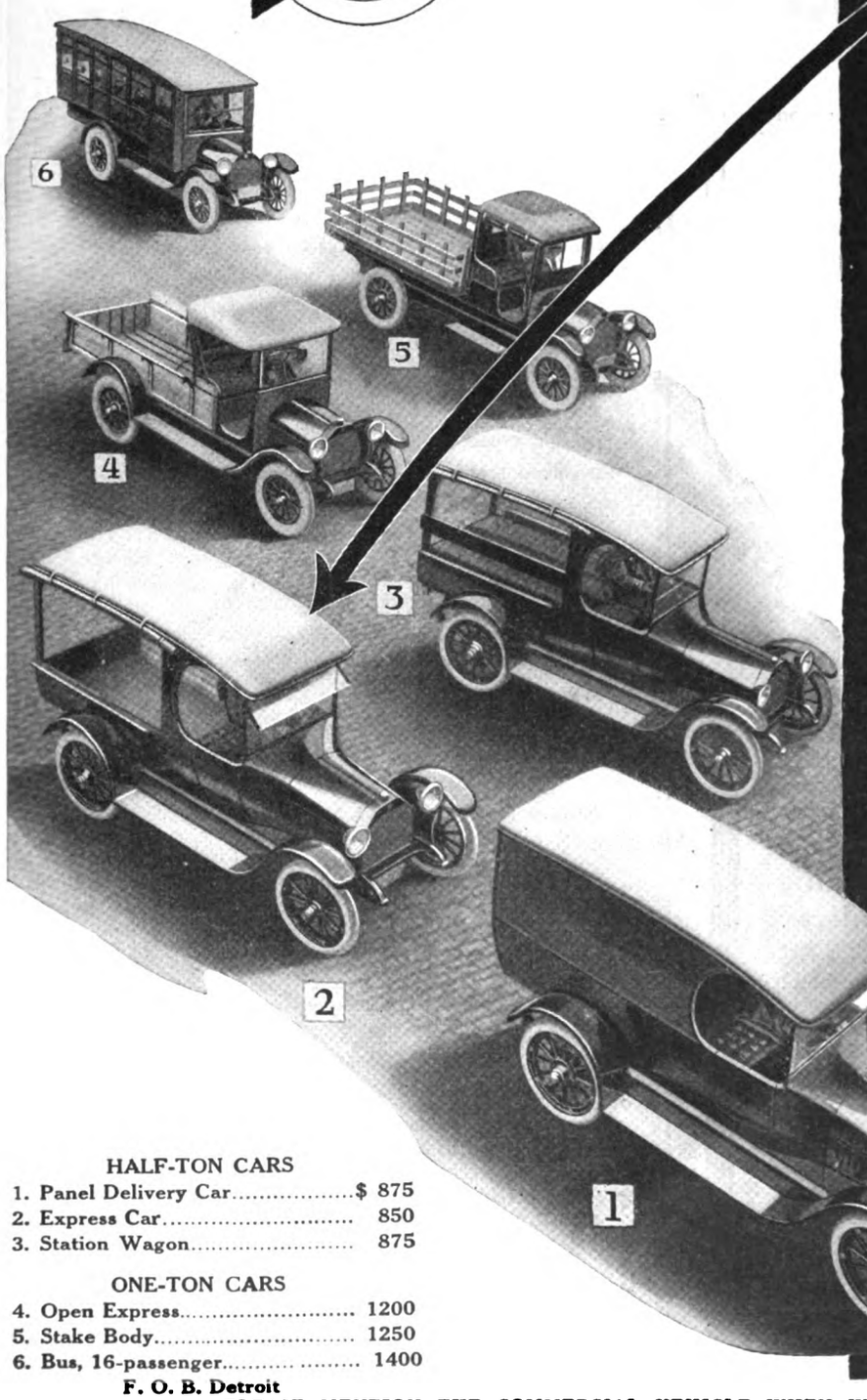
REGISTER OF AVAILABLE TRUCKS

Owners, operators, manufacturers, dealers and agents are invited to list their trucks in this register without charge. It is intended that this register be national in scope, so that if a shipper in one city wants to have goods shipped to him by trucks from another city, THE COMMERCIAL VEHICLE can give him a list of the trucks available in that city. There will be no charge for this information.

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The Open Express at $850

Here is another of the Studebaker line of Commercial Cars—only ONE of SIX cars, mind you—but consider the selling opportunities the Studebaker Dealer has for this ONE car:

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Grocers
Fruit Dealers
Wholesalers
Expressmen
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Butchers
Contractors
Plumbers
and many others

Think what a market for just one car. Then, think what a market the Studebaker Dealer has for his complete line of SIX cars, each of which has equally as extensive selling possibilities as this Express Car at $850.

No business in the country offers such a remarkable chance for a progressive man to build lastingly and PROFITABLY as the commercial car industry.

The use of commercial cars is growing daily. And to the men who get in EARLY it offers doubly attractive prospects. We urge every man to write at once for complete information on the Studebaker Line and the Studebaker Dealership in his community.

HALF-TON CARS

1. Panel Delivery Car	$ 875
2. Express Car	850
3. Station Wagon	875

ONE-TON CARS

4. Open Express	1200
5. Stake Body	1250
6. Bus, 16-passenger	1400

F. O. B. Detroit

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R & M Conform Piston Rings

Maintain Compression— Minimize Friction

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Also pole, semi, and pleasure car trailers.

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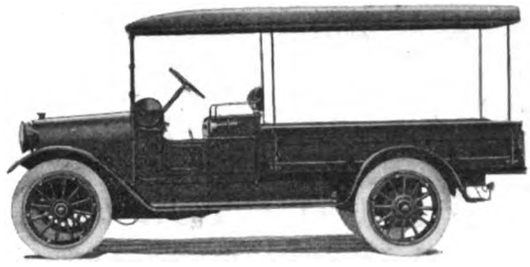
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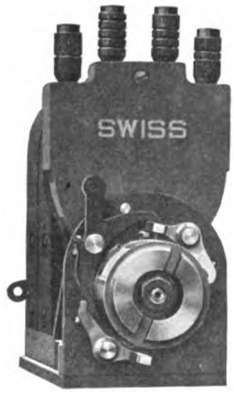
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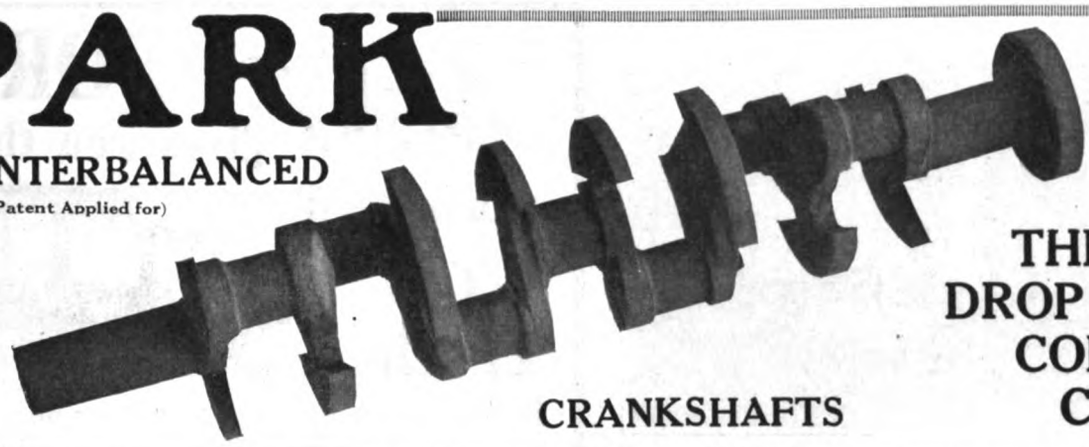
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COUNTERBALANCED

(Patent Applied for)

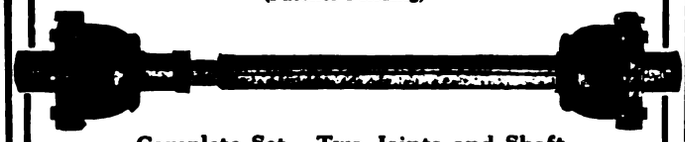


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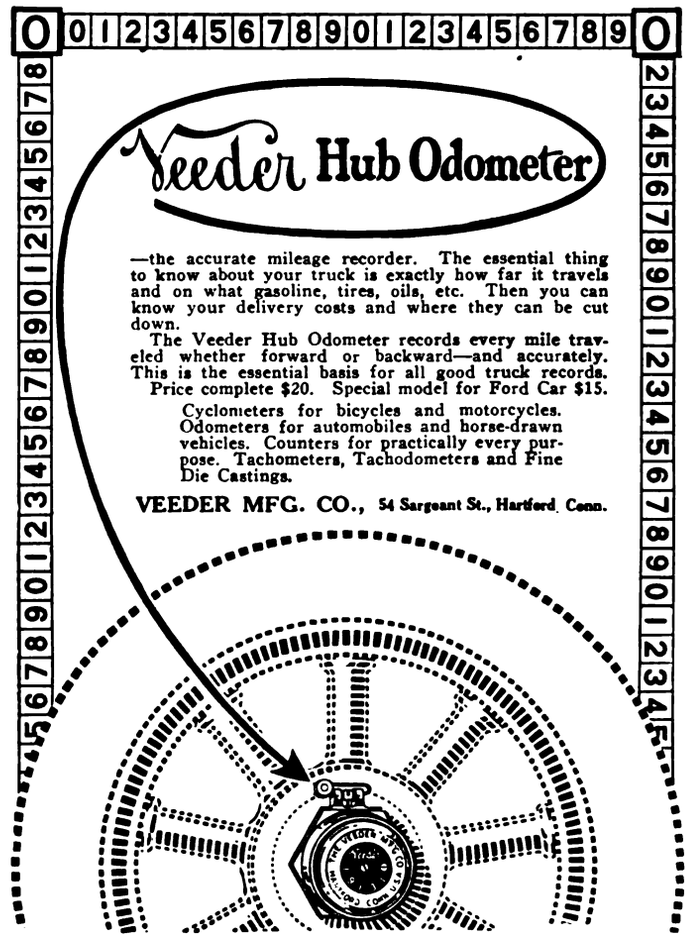
Veeder Hub Odometer

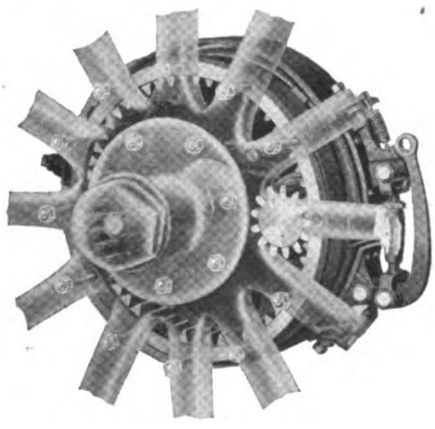
—the accurate mileage recorder. The essential thing to know about your truck is exactly how far it travels and on what gasoline, tires, oils, etc. Then you can know your delivery costs and where they can be cut down.

The Veeder Hub Odometer records every mile traveled whether forward or backward—and accurately. This is the essential basis for all good truck records. Price complete $20. Special model for Ford Car $15.

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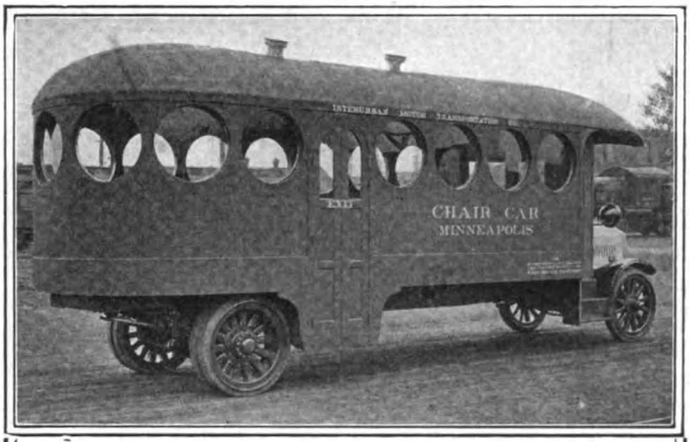
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THE INTERNAL GEAR DRIVE AXLE

The coming drive for all trucks that have to work to earn their cost—least attention—trouble-proof—drive near rim of wheel. Half-ton to five-ton capacity.

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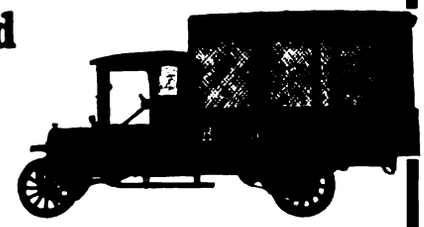
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27 Individual Chairs
(Combination spring-air cushioned standards)
All the comforts and fascination of rail travel
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McKEEN MOTOR CAR COMPANY
OMAHA, NEB.
(Builders of the famous "McKeen" Railroad Gasoline Motor Cars)
Flanged wheels for railroad service
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$350 and a FORD gives you this guaranteed 1-Ton Truck



In other words, for less than half the price, you get equal carrying capacity and efficiency to trucks costing $1500 or more, coupled with FORD DEPENDABILITY, DURABILITY AND UPKEEP ECONOMY.

Here's the TRUCK everybody wants, same as the Ford is the universal car. Think of the opportunity for sales in your city on the truck that GIVES THE CHEAPEST DELIVERY COST IN THE WORLD.

For full particulars about the wonderful Smith Form-a-Truck Attachment that instantly makes a guaranteed one ton truck of any Ford, and for OUR GREAT EXCLUSIVE DEALER'S PROPOSITION, address

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FORM-A-TRUCK CO.
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CHICAGO ILLINOIS

Sterling TRUCKS

THIS complete line of worm gear driven trucks affords the dealer an unusually profitable opportunity. Write for open territory.

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"D. & C. A SERVICE GUARANTEE"

Daily service between Detroit and Buffalo and Detroit and Cleveland. Day trips during July and August, as well as two boats out of Detroit and Cleveland every Saturday and Sunday nights during these two months. FOUR TRIPS WEEKLY FROM TOLEDO AND DETROIT TO MACKINAC ISLAND AND WAY PORTS—From June 25th to Sept. 10th, SPECIAL STEAMER CLEVELAND TO MACKINAC ISLAND. TWO TRIPS WEEKLY. NO STOPS ENROUTE EXCEPT AT DETROIT EVERY TRIP. Daily service between Toledo and Put-in-Bay, June 10th to Sept. 10th.

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Garford

MOTOR TRUCKS

Garford Trucks range from one ton to six tons in capacity.

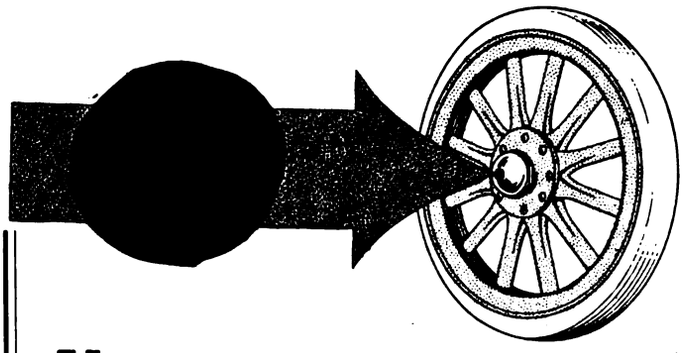
They are designed and built by men who have spent their lives in the study of motor trucks.

They are backed by one of the strongest organizations in the industry.

Bodies are provided to meet all requirements.

Write for catalog. Please address Dept. 103

The Garford Motor Truck Co., Lima, O.



You can save money

—you can stop the leaks in your truck operation by keeping mileage records with the

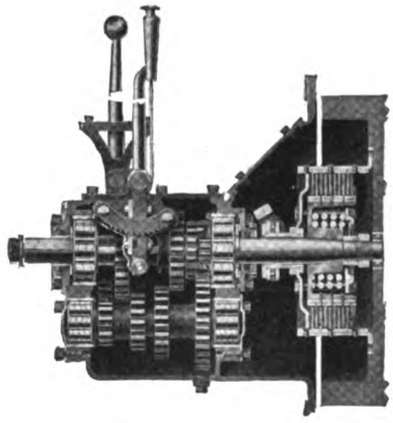
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Indestructible
Hub Odometer

It's guaranteed indestructible—if it is knocked off or broken we'll give you a new one free. Always working—always accurate. Easy to read because the figures do not revolve and cannot be hidden by grease or dust.

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Manufacturers of Jones and Popp Taximeters
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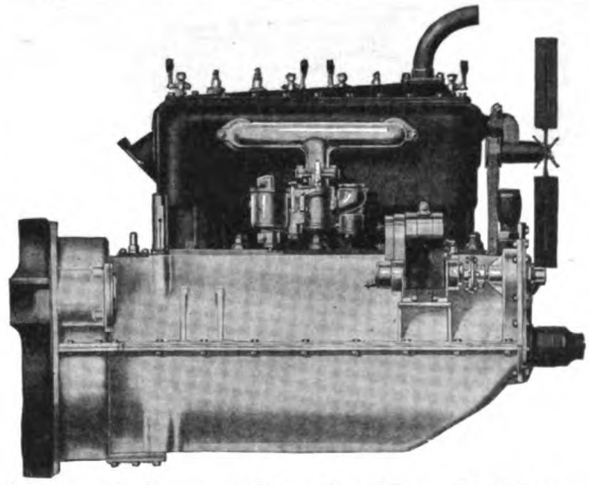
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Made in various models for different sizes and types of cars—Covert Transmissions will free you from transmission troubles. Let us show you how they fit your construction.

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A Real Long Stroke Truck Motor

Type T U, 4 x 6; Type U U, 4½ x 6; cylinders interchangeable. Crankshaft, four bearing, chrome nickel steel, 2 in. diameter. Bearings, bronze, Fahrig metal lined. Camshaft, one piece, cams integral. Oiling system, force feed, hollow crankshaft.

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New York Branch: 50 Church Street. T. M. Fenner, Factory Representative. Pacific Coast Representative: Earl P. Cooper Co., 1428 Bush Street, San Francisco; 333 West Pico Street, Los Angeles.

Wisconsin
CONSISTENT Motors

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"The Truck That Thinks"

The ideal commercial truck possesses four essentials — Simplicity — Low Maintenance Cost—High Efficiency and Absolute Dependability—That's the KREBS.

It is powerful, economical and needs no mechanic to drive it. The driver has nothing to do but steer.

The KREBS Automatic Governor positively keeps the motor at a certain speed and is assurance against the results of reckless driving.

Continental Motor, Timken Axles, Special economical KREBS Carburetor, Timken-Brown Worm Drive — are a few of the important essentials.

In ¾, 1, 2, 3, and 3½ ton capacities with bodies for any business.

Send for catalog—it will show you why you need the KREBS —the most efficient truck in the world.

The Krebs Commercial Car Co.
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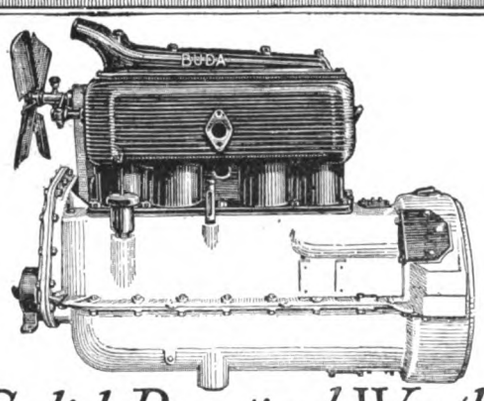
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transmissions and differentials represent the maximum from a standpoint of effiency and durability.

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in the highest possible degree is the goal successfully attained by the,

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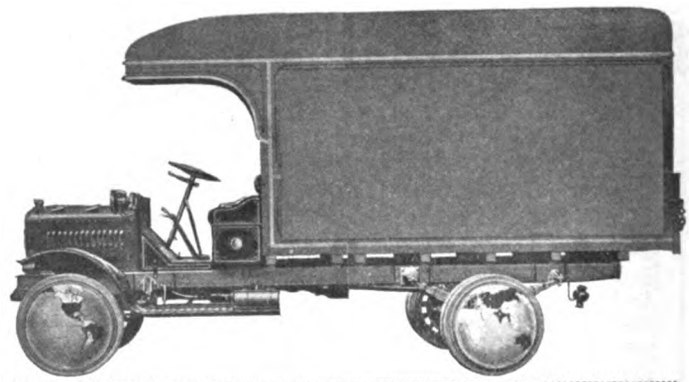
Truck value is practically determined by the efficiency and durability of the motor. The value of *your* trucks should be insured by the 35 years of manufacturing integrity which stands behind the Buda Motor.

The BUDA COMPANY
HARVEY CHICAGO SUBURB ILLINOIS

Models for all trucks.

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Models for all cars, too.



WICHITA TRUCKS
Dependability Plus Extensive Service
ARE YOU THE DEALER

who can put into your salesmanship WICHITA Energy and Spirit and back up your selling accomplishments with WICHITA Service?
If you are such a dealer, we have an interesting selling plan that you will not want to miss considering.
The faithful co-operation of our factory organization will give you encouraging help.
We want live dealers NOW—Men who will interest concerns in our heavy-duty trucks, and then to not let up on them until they sell them.
Request us to immediately submit our plans.

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Write for interview or send in your specifications.

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A full line of Commercial Vehicles from a 1500 lb. Delivery Car to a 3½ ton Truck.

All Ready by September

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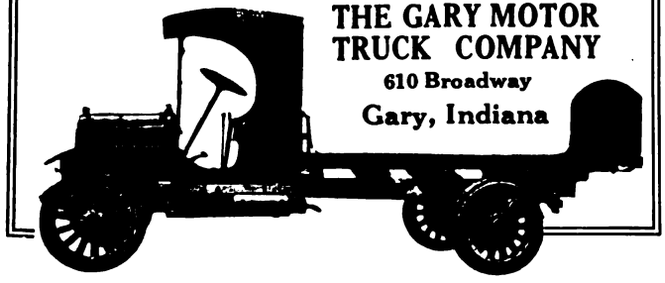
The Star Union Brewing Co., of Peru, Ill., is duplicating—

The Worm Drive GARY TRUCK

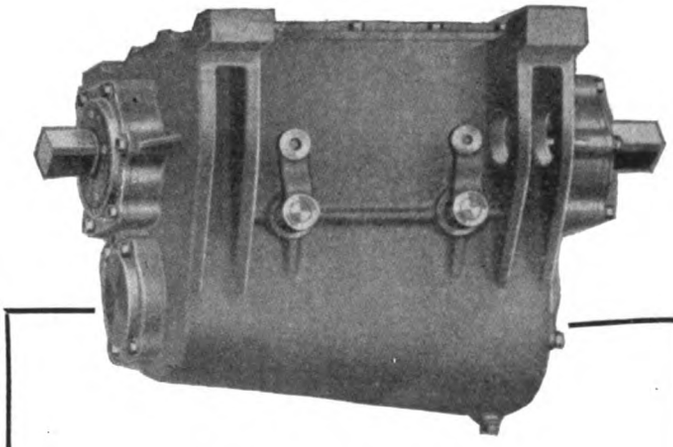
—now on duty in Peru, for its Peoria branch.

It's the same story we've had to tell ever since GARY Trucks first became established in the field—50% of our business is repeat orders from GARY owners—the best recommendation for Gary service.
Every refinement known to increase efficiency is incorporated in the GARY Truck, by expert workmen.
The result is 4 GARY models, 4 capacities at 4 prices that are right—ready to handle any load you want to move—and to give satisfaction that will make you come back for more.
Try one GARY in service with any assortment of best known trucks. Your fleet will eventually be a GARY fleet.
Dealers—Reorders and generous new business make GARY the logical truck for dealers.

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Gary, Indiana



SAFETY

—devices protect chauffeurs who operate machines equipped with COTTA Transmissions.

Special COTTA equipment provides a locking device, which positively prevents engagement of two speeds at the same time.

Regardless of speed of car or rotation of gears, speed changes are made easily and instantly with the COTTA Transmission.

Have your next car COTTA safe-guarded.

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That's Real Service

said one of our customers.

Yes! and we can give *your* felt orders the same prompt attention if you'll let us.

Why not try doing business with an A-1 house and get "what you want when you want it"?

Dependable goods only; accuracy in manufacture, prompt service and attractive prices are the watchwords of our business.

"If it's made of felt, ask Booth"

Write—Wire or Phone

The Booth Felt Co., Inc.

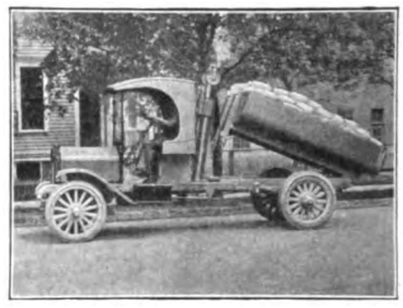
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Stegeman

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SELF-STARTER

WORM-DRIVE

TRUCKS



The most for your money—that's what we offer. A 6-cylinder Motor, Electric-Starter and Electric-Lights are furnished on our truck without extra charge. On any other machine they would cost $300 extra.

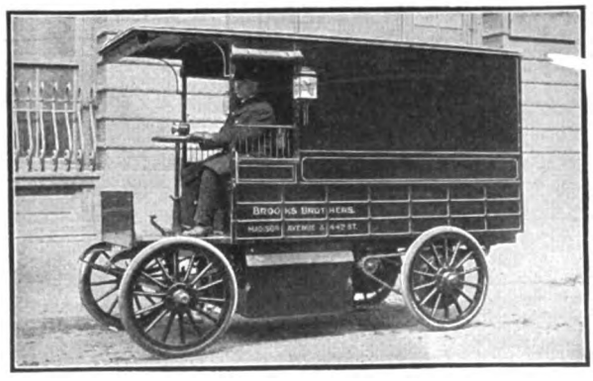
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G. V. ELECTRIC TRUCKS

SIX MODELS: 1,000 POUNDS TO 5 TONS



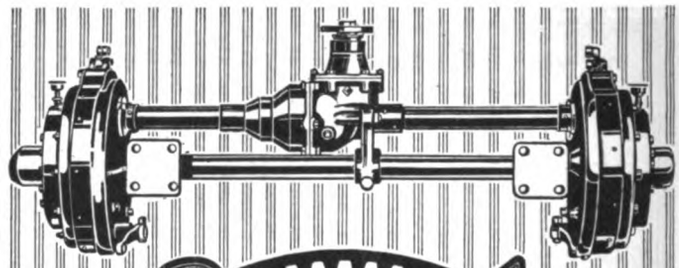
Nearly 5,000 in use
Catalog on request

General Vehicle Company, Inc.

GENERAL OFFICE AND FACTORY
LONG ISLAND CITY, NEW YORK

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1684



Russel
Internal Gear Drive Axles

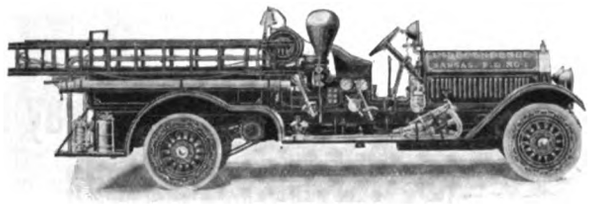
SELLING trucks these days is not difficult, for the industries of the country are awakening to the advantages of motorized delivery.
Make your sales even easier by using trucks driven by the Russel Internal Gear Drive Axle.
Industrial preparedness demands that the most serviceable, durable and efficient form of truck haulage be adopted by you.

Adopt, therefore, a truck using The Russel Internal Gear Drive Axle

Russel Motor Axle Co., North Detroit

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SOUTH BEND DOUBLE DUTY FIRE APPARATUS

Built for SERVICE

Reliability and Efficiency

SOUTH BEND MOTOR CAR WORKS
SOUTH BEND, IND.

U. S. BALL BEARINGS ASSURE PERFECT SERVICE

The engineering accuracy of U. S. Ball Bearings insures perfect bearing service.

Every piece of steel used in the manufacture of bearings must pass our test for chemical and physical properties and be approved by our laboratory before being allowed to enter our Production Department.

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Equipped with the most exact measuring devices, together with our ideal to produce perfect bearings, every precaution is taken to assure ourselves that nothing but the highest quality goods leave our factory.

U. S. Ball Bearings are built to meet every possible radial, combined and thrust load. Write for catalog F. It will give you detailed information.

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(Conrad Patent Licensee)
Palmer St. and Kolmar Ave. Chicago

U S.
Trade Mark

U.S. Made for U.S. Trade

NORTH AMERICAN MOTORS

4-⅜ in. x 6 in.—45 H. P.—1200 R. P. M.

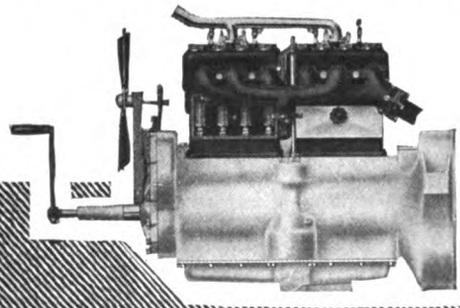
Expressly Designed to Take Care of the Most Exacting Conditions in Truck Service

Model N is a Long-Stroke Motor with a Tenacious Pulling Power—the very essential demanded by successful builders of motor trucks.

Rich with such features as Timing Shaft driven by Silent Chain, Speed Governor, Valves all on one side, enclosed and easily accessible by removable plates, and intake and exhaust manifolds on one side, with magneto on opposite side, removed from heat of exhaust manifold.

There are other good reasons why you should use the North American Motor. Let us tell you about them and quote prices.

North American Motor Co., Pottstown, Pa.



"Little Giant"

The Truck for All America



—for eight long years Little Giants have proved themselves—their big efficiency—solid service—real economy. They are backed by every dollar of the more than $11,000,000 capital and resources of Chicago Pneumatic Tool Company—a twenty-two-year-old concern with 25,000 active customers—eight great factories in this country and abroad—branch houses, agencies and service stations almost everywhere.

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Dealers:—Write for interesting proposition

CHICAGO PNEUMATIC TOOL COMPANY
Dept. P., 1615 Michigan Ave., Chicago
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THE LITTLE GIANT LINE

Model 15—1-ton Worm Drive, Chassis Price.....$1500
Model H—1-ton Chain Drive, Chassis Price.....$1400
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Model 16—2-ton Worm Drive, Chassis Price.....$2500

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Throughout the United States

the unprecedented increase in all kinds of business has confronted merchants with delivery problems which must be solved. Their delivery zones must be enlarged and delivery efficiency and delivery economy must go together.

The answer to the problem is the

Commerce Truck

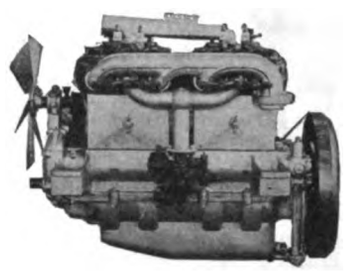
THIS CHASSIS OF 1500 LBS. CAPACITY with standardized component parts meets the gasoline situation fairly by giving the greatest mileage per gallon of any commercial vehicle of equal capacity. The first cost is low and the upkeep expense is very little, owing to the simplicity and quality of material and workmanship.

To truck dealers this line offers exceptional opportunities for large sales at this period of big business. Those who own Commerce Trucks will buy more and many who have relied on horse-drawn vehicles will now be in the market for motor trucks.

DEALERS send today for our proposition. Get specifications of our chassis and line of bodies. There's a big field for you. The time to coin money and build up your business is now—the vehicle to do it with is the Commerce Truck.

Commerce Motor Car Co., Detroit, Mich.

W. H. BRINKERHOFF, Eastern Representative
12 Belmont Ave., Elmhurst, Long Island, New York



Beaver Motors Make Their Way By The Way They Are Made

BEAVER MOTORS are made by truck motor specialists. The concentrated experience of engineers of international reputation is embodied in their construction.

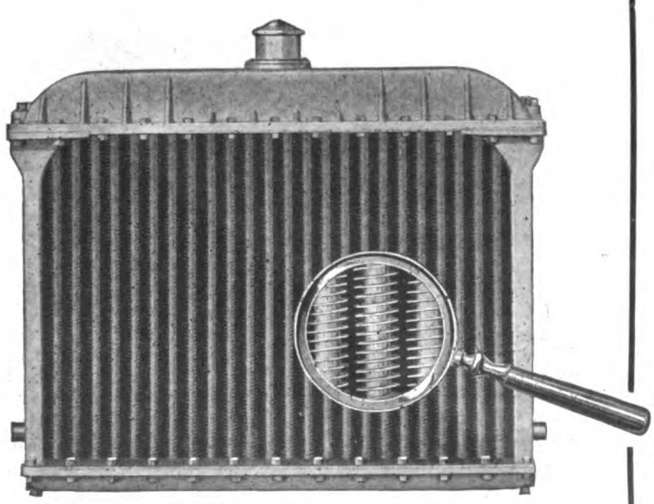
BEAVER TRUCK MOTORS are made by men who make nothing but motors—who, by doing the same thing over and over have become masters in perfection. That is why we can make truck motors better, quicker, and at less cost than the truck manufacturer himself.

We make truck motors of all sizes, for all requirements. No matter whether you are building a 1,500 pound light delivery wagon or a 5-ton truck, we can meet your demands for power, economy and dependability.

Do not determine on a motor for your truck till you have sent us your specifications

BEAVER MFG. OOMPANY
Milwaukee Wisconsin

Seamless Copper Helical Tube Cooling Sections

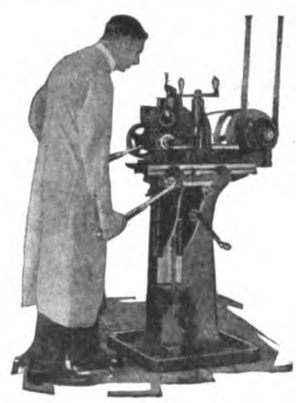


Are Guaranteed for the Life of the Motor on Which They are Installed

Helical Tube Construction is Accepted as the Best by the Leading Truck Makers of America

Manufactured only by

ROME-TURNEY RADIATOR CO.
ROME, NEW YORK



Here's What You Need in Your Garage or Repair Shop

because it is an all around machine and has features that make it a necessary tool for your line of work.

The "Whitney" Hand Miller

will cut gears, cams, sprockets, do key seating, profiling, slotting, slabbing, straddle milling, and hundreds of other operations.

Our Universal Milling Attachment permits the use of end mills and makes the machine desirable for drilling and all classes of milling where small cutters and high speeds are necessary.

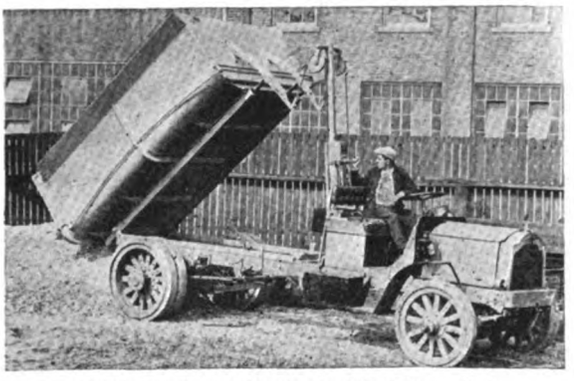
Simply drop a postal for our Miller Bulletin.

The Whitney Mfg. Co. Hartford, Conn.

Chains—Keys—Hand Milling Machines.

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EASE of operation is one important reason for WOOD hoist supremacy. There are, naturally, others.

NINETY per cent of the truck makers in this country list WOOD bodies as standard equipment—*why?*

Talk it over with your dealer today

WOOD HYDRAULIC HOIST AND BODY CO.
DETROIT

WOOD HOISTS
WOOD BODIES

DON'T

throw your old bearings away just because they are worn or broken.

We regrind the raceways (without drawing the temper) insert new balls and retainer AT about one-fifth the cost of a new bearing.

Any broken or worn bearing can be exchanged at any of our service stations, for reground bearings of any type or make, which are guaranteed equal to new.

These stations also carry complete stocks of New Single Row Annular, Thrust, NEW DOUBLE Row and Radax Bearings.

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For Diamond, Baldwin and Whitney Chains

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Sprockets in stock and to order

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Under Control

Jail should await the truck owner who does not know that the linings of his brakes are in perfect condition.

A heavy truck with bad brakes is a lawless menace.

Thermoid
HYDRAULIC COMPRESSED
Brake Lining - 100%

100% because it's brake lining clear through, not merely on the surface. It will hold though worn paper thin.

Thermoid is cured under hydraulic pressure into a solid substance of uniform density. It is the best brake lining you can buy.

Write for facts and samples.

Cannot be burned out nor affected by oil, heat, water, gasoline, dirt.

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Our Guarantee: THERMOID will make good or we will.



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OVERLOADED 20 PER CENT.

Every hill on this route through Ohio and Michigan was taken on high without straining. Read the story in our booklet "The Wizard of Trucking." Only a Six and only a "Globe" could do it on 12½ miles per gallon of gas.



Six Cylinder Motor

trucks handle like a pleasure car. Start easier. On high 1½ miles to 25 miles per hour. 11 to 15 miles per gallon of gas. Quieter operation. Minimum motor vibration. Go anywhere, any roads, any time. Agencies being established rapidly. Write today.

MFG. BY

THE GLOBE MOTOR TRUCK CO.

NORTHVILLE, MICH.



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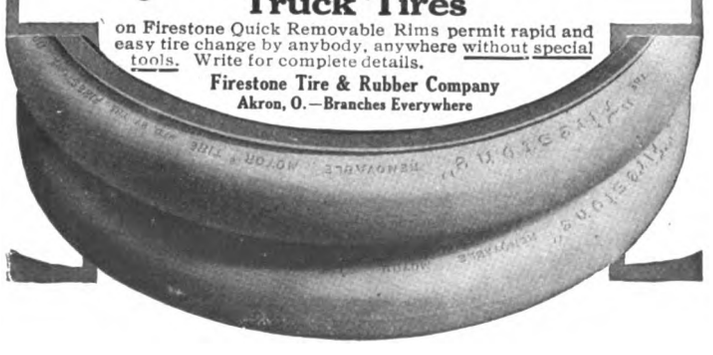
Exclusive features of Firestone Truck Tires answer the business need for—*Most Mileage—Continuous Operation—Low Maintenance Cost*

Firestone

Truck Tires

on Firestone Quick Removable Rims permit rapid and easy tire change by anybody, anywhere without special tools. Write for complete details.

Firestone Tire & Rubber Company
Akron, O.—Branches Everywhere



AS CONSTANT AS NIAGARA



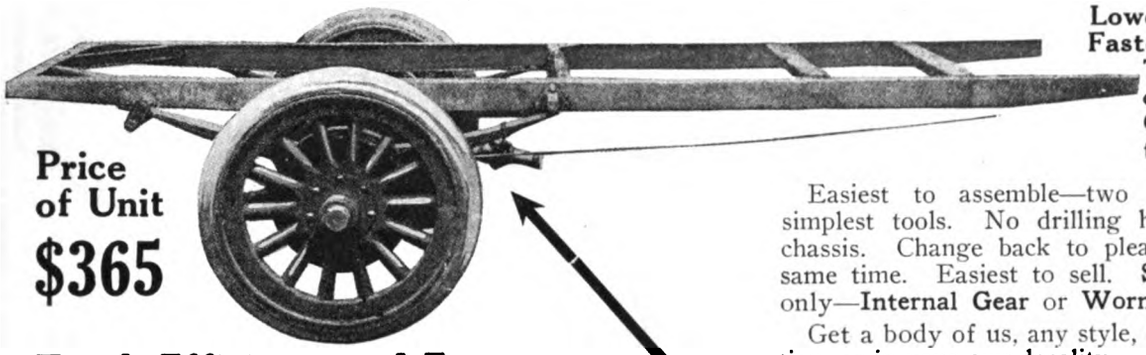
FOR MOTOR CARS MOTOR TRUCKS TRACTORS

LONG MFG. CO., DETROIT, MICH.

PIONEER MAKERS of Gasoline Engine Cooling Systems

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KELLEY CONVERTIBLE AUTO TRUCK



Lowest Priced, Fastest Selling Truck Unit of Similar Construction

Price of Unit **$365**

Easiest to assemble—two hours' job, simplest tools. No drilling holes in car chassis. Change back to pleasure car in same time. Easiest to sell. **Shaft Drive** only—**Internal Gear** or **Worm Drive.**

Get a body of us, any style, on specification, or in your own locality.

Truck Efficiency and Economy

For simplicity of construction and attachment, strength, and utility unequaled by any other rear system.

Makes a **One-Ton Truck** (with capacity of 50 per cent overload) of any light pleasure car—Ford, Maxwell, Chevrolet, and a number of others. Also larger cars on special order.

Our Dealers Make Big Money!

Territory to responsible agents. Write for details.

Kelley Convertible Auto-Truck Co.
NOT INC.
Sales and Executive Offices:
332 Michigan Ave. Chicago, Ill.
FACTORIES: JOLIET, ILL.



SPECIFICATIONS

Carrying capacity, 3000 lbs. Carrying space—regular 9 feet, more if desired; wheelbase, 127 inches, more if desired; tires, 32x3½ inch solid; speed, 15 to 25 miles per hour; gear ratio can be adapted to any conditions under which truck is to be used; brake on rear wheel, 1⅞" face, 16-inch drum; tread, standard 56 inch.

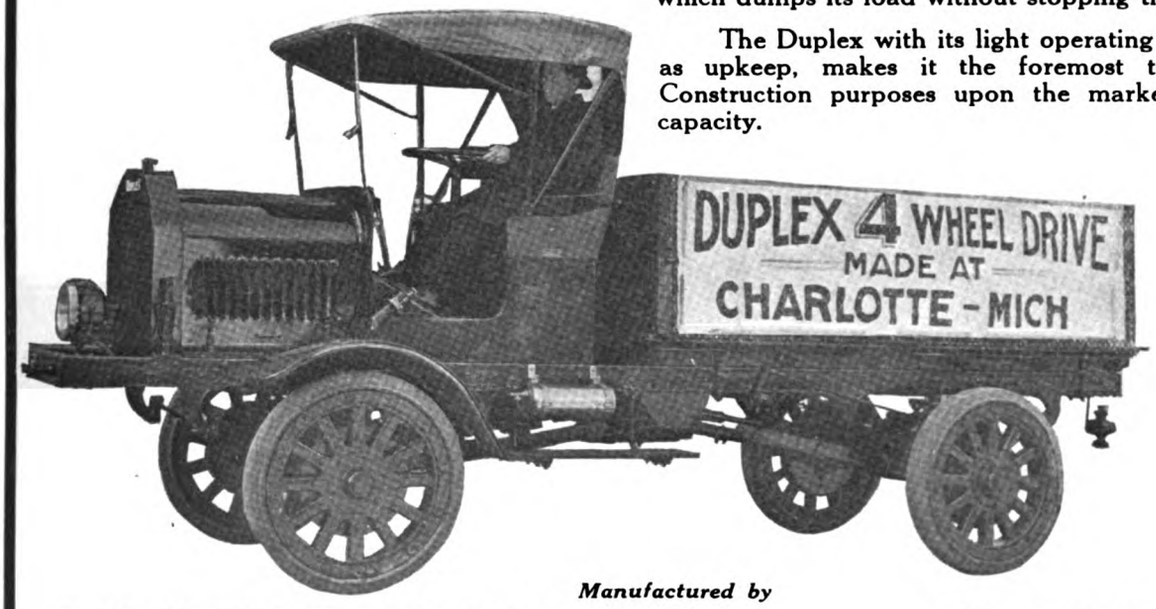
DUPLEX 4 WHEEL DRIVE

THE TRUCK OF EARNING EFFICIENCY

This cut represents the Duplex 4-Wheel Drive Road Truck, and is one of many others hauling one hundred and fourteen yards of gravel every twenty-four hours, a distance of 7.7 miles and at $1.00 per yard, earns $114.00 per day.

This truck with trailer has Duplex Side Dump Body which dumps its load without stopping the truck.

The Duplex with its light operating expense as well as upkeep, makes it the foremost truck for Road Construction purposes upon the market regardless of capacity.



Made in two-and three-ton capacity

Manufactured by

DUPLEX POWER CAR CO., Charlotte, Mich.

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EISEMANN
MAGNETOS

The Most Efficient
The Most Durable
The Most Simple
The Most Accessible
Magnetos Ever Produced



EISEMANN
MAGNETOS

have been adopted as standard equipment by the great ignition experts of

108 Manufacturers

—the largest in the country—including

72 Trucks
11 Pleasure Cars
25 Miscellaneous

(Tractors, Mining Machinery, Stationary Engines Gasoline Locomotives, etc.)

There Must Be a Reason!

THE EISEMANN MAGNETO CO.
Sales and General Offices:
32-33rd Street, Brooklyn, N. Y.
Indianapolis, Ind., 415-417 N. Capitol Ave.
Detroit, Mich., 802 Woodward Ave.



Limits the Speed and the Expense

The only Governor designed solely for internal combustion engines.

Has no connection to any moving part of the engine or vehicle.

Requires no oiling or attention.

Acts instantaneously and automatically with the changing engine load.

Regulates the speed of the engine accurately ——*always.*

Ask us for information—ask our customers for facts.

MONARCH GOVERNOR CO.
DETROIT U. S. A.

Standard
MADE IN DETROIT USA

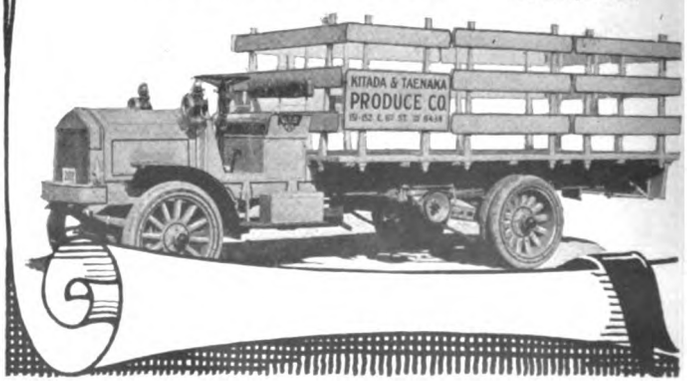
Motor Trucks

Startled the Motor Truck Industry By a Unique Sales Plan

First of all, the Standard is an unusual truck. It is a powerful combination of many of the world's best-known units—the Continental Motor; Timken Axles; Timken Bearings; Brown-Lipe Gears, and other well-known standard parts.

The Standard Motor Truck is sold in an unusual way. Any responsible person can be the agent for the Standard, with absolutely *no investment—no deposit* and *no contract.*

Write for details of this plan. No obligation.
STANDARD MOTOR TRUCK CO., 315-327 Bellevue Ave. Detroit, Mich.



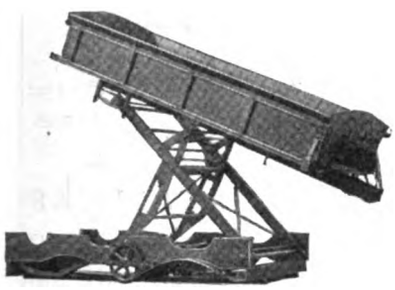
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Coal-Haulers

throughout the United States will welcome the news of this new invention in elevating bodies.

If you are thinking of increasing your fleet now or soon, please note that it is possible for you to order one or more of them at once, through your local dealer, regardless of the make of chassis you select.

Fits Any Truck



These bodies are built in all capacities, are equipped with power drive, and are safety locked during elevation. However, get the full facts, prices, etc., by writing in for descriptive bulletin No. 5. Do this now.

For the special information of dealers, we will be glad to supply further details.

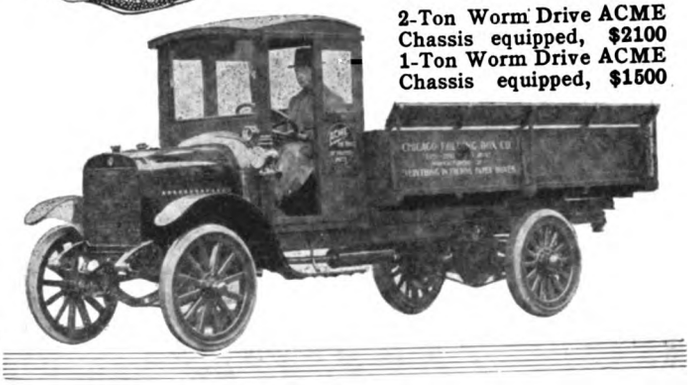
The Lally Commercial Body Co.
EVERETT MASS.

SURE SALES!

ACME THE TRUCK OF PROVED UNITS

ACME Truck Superiorities Close Dealers' Prospects!

2-Ton Worm Drive ACME Chassis equipped, $2100
1-Ton Worm Drive ACME Chassis equipped, $1500



Dealers! Those truck buyers in your district whom you have not sold *CAN BE "CLOSED" NOW* with ACME Worm Drive Trucks. ACME Proved Units and fortified construction answer all questions *in advance*. Fifteen famous features provide *sure service* the prospective buyer can *see before purchase*—mean *sure sales* and *sure repeats*.

Continental Motor	Warner Clutch	Rayfield Carburetor
Timken Worm Drive	Warner Transmission	Gemmer Steering Gear
Timken Front Axle	Detroit Springs	Smith Pressed Steel Frame
Timken Rear Axle	Long Radiator	Pierce Governor
Timken Bearings	Eisemann Magneto	Stewart Vacuum System

Quick Deliveries

You don't have to wait for ACME trucks. Our ample production takes care of all contracts *on time!*

Write for Sure-Profit Proposition!

Easy sales and big profits! Least service to render. Your expense reduced to a minimum.

Local advertising and sales co-operation that gets results!

Send Coupon for Blank Agency Contract and full particulars.

Cadillac Auto Truck Company
19 Mitchell Street
CADILLAC, MICHIGAN

CADILLAC AUTO TRUCK COMPANY
19 Mitchell St.
Cadillac, Mich.

Please supply complete information about the ACME 2 Ton and 1 Ton Trucks and Blank Agency Contract, with full details of your attractive offer for progressive representation in this territory.

Firm Name.....
Individual Name.....
Address .....
Town ..... State.....
Present Agent for.....

United States 'Solid Truck' Tires



PERFECT

We believe that the United States Motor Truck Tire is as perfect as it is humanly possible to make a tire.

It is the result of years of experimentation by the chemists, engineers and manufacturing experts of the largest rubber company in the world.

Let us tell you more about United States Motor Truck Tires.

United States Tire Company
Broadway and 58th Street, New York

US RUBBER SYSTEM — UNITED STATES RUBBER COMPANY AND ASSOCIATED COMPANIES

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ONE TRUCK SELLS THIRTEEN

THE above illustration is one of a fleet of twenty MACK trucks in the service of the Metropolitan Coal Company of Boston and its subsidiary branches.

Their first

Mack

Worm Drive Truck

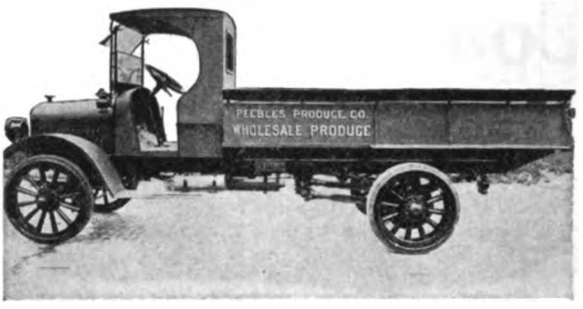
purchased in January of this year, made such a wonderful record in the worst snow storms and under the worst road conditions that Boston has ever experienced, that the company decided to standardize on MACK trucks.

Thirteen more MACK one and one-half ton dump trucks have been ordered already.

Incidentally it is a pretty good stroke of business for our Boston representative.

Write for particulars.

THE INTERNATIONAL MOTOR COMPANY
West End Ave. and 64th St.
New York City



$1875 Buys a NILES two-ton Chassis complete, except body. If this Truck were sold thru a dealer, it would cost you not less than $2500.

$1175 Buys a NILES three-qtr. to one-ton Chassis. Thru a dealer about $1500.

Niles Motor Trucks are sold "DIRECT TO THE USER" and no middleman receives a profit on same.

Isn't this fair to the purchaser?

Further, Niles Trucks are not sold at cut prices, no discounts are allowed. Every man's dollar has the same purchasing power on a Niles Truck. We do not inflate its value with a high list price, and then reduce the value by offering variable discounts to fit each purchaser's pocket book.

Second Hand Trucks or other articles are not taken in trade as part payment on Niles Trucks. Write us why we adopted this policy. It's interesting.

Service means taking care of the Truck after its delivery. Keeping it running every day at the lowest possible cost. How can we do this without dealers? Well, we are doing it, and satisfactory to Niles users too. A postal card to us will bring back the proof.

Quality is consistent thruout Niles construction. Better parts cannot be purchased than we use, and the parts we manufacture are consistent with those we purchase. High grade workmanship and interchangeability are assured

WRITE FOR OUR LITERATURE

The Niles Car & Manufacturing Co.
Niles, Ohio, U. S. A.

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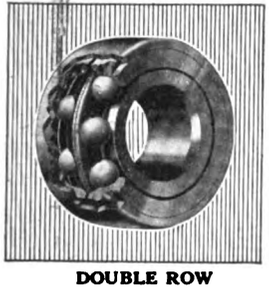
The cost and Increased of fuel lubricant



can be practically offset by

NEW DEPARTURE BALL BEARINGS

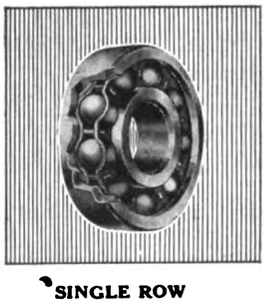
American Made for American Trade



DOUBLE ROW

The use of these bearings insures maximum power at the driving wheels and in proportion as the installation of New Departures throughout the working units of the chassis is complete, you will find the efficiency of your car increased.

How it is possible for New Departures to accomplish this result is most interestingly told by picture and text in our book entitled



SINGLE ROW

New Departure Ball Bearings, What they Mean to the Motor Car Owner.

Send for the Brown Book

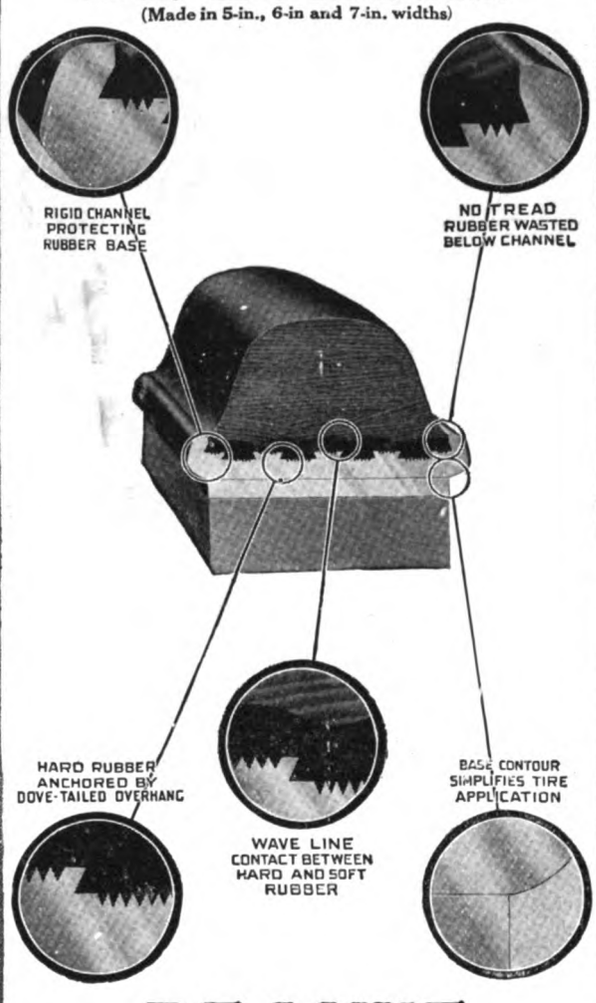
THE NEW DEPARTURE MFG. CO.

BRISTOL, CONN., U. S. A.

Western Branch: 818-20 Ford Bldg., Detroit, Michigan.
Distributors in Trade Centers throughout the United States.
Sole British Agents: Brown Bros., Ltd., London, Manchester.
Continental Europe: Jacob Holst, Copenhagen, Denmark.

GOODRICH DE LUXE TRUCK TIRES

(Made in 5-in., 6-in and 7-in. widths)



DE LUXE

The tire of extra volume, durable, resilient tread rubber. Experiences of truck operators in all parts of the country prove it the biggest *mileage giver* in all forms of exacting service.

Write for catalog.

The B. F. Goodrich Company

AKRON, OHIO

Makers of the Celebrated Goodrich Automobile Tires—"*Best in the Long Run.*"

Service Stations and Branches in All Important Trucking Centers.

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On the job—always

The reason Signal Motor Trucks are "on the job"—always—is that they are designed and built for that purpose by men who know how to design and build for that purpose.

It is one thing to **say** you build your trucks that way; another thing to build them that way.

It is because we build Signal Trucks to "stay on the job" that we use such high quality constructional units as Continental Motors, Timken-David Brown Worm Drive rear axles, Brown-Lipe Transmissions, Ross Steering Gears, Eisemann Magnetos, etc.

Is is because we use such positively high grade construction that we are not afraid to say exactly what we mean.

It is possible to build cheaper trucks but it isn't possible to build any better trucks.

Moreover, what we say applies with equal force to our one-ton jobs and our five-ton jobs—and all the sizes in between.

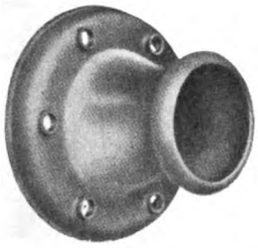
Signal sales are growing. Signal reputation is spreading. Everybody says the Signal has the cleanest mechanism of any truck made. That fact helps the sales as much as it helps the service.

Dealers who are interested in both Sales and Service—and owners who are interested in Service more than Sales, find the clean-cut Signal chassis equally attractive.
Write for literature.

SIGNAL

Motor Truck Co.
DETROIT, MICHIGAN

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BOSSERT PRODUCTION COST

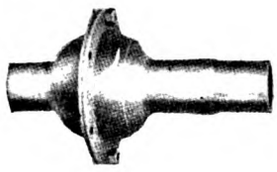


The use of pressed steel parts in place of malleable iron, steel castings or drop forgings will lower production cost and decrease weight without lessening strength in any way.

There are many parts in a truck where this change can be advantageously made.

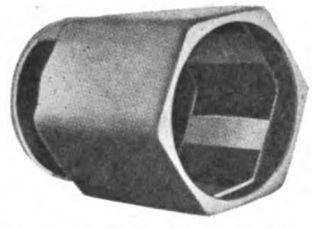
THE BOSSERT WAY

In the most modern plant which brains, money and experience can devise, we make over 200 pressed steel parts. Send us a sample of your spring hangers, running boards, brake drums or a score of other parts and our engineers will demonstrate to you an equal or better product at a lower cost.



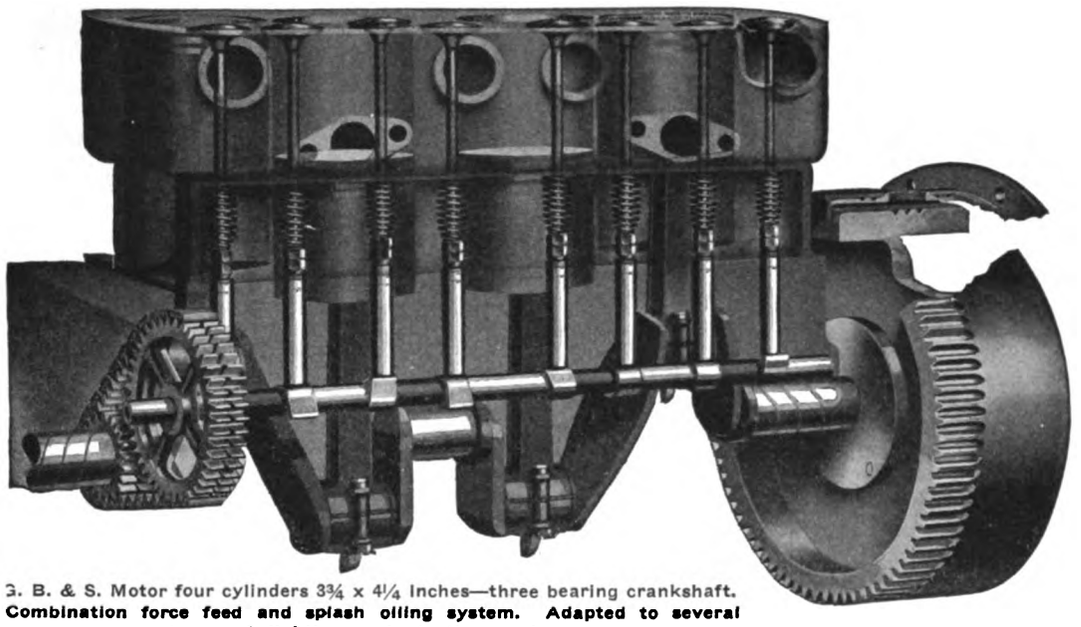
The Bossert Company

Utica, N. Y.



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It Satisfies



G. B. & S. Motor four cylinders 3¾ x 4¼ inches—three bearing crankshaft. Combination force feed and splash oiling system. Adapted to several types of lighting and starting systems

G·B&S motor

THE subtlest and most searching of all engineering tests, pales into insignificance beside the answer to the question, "Does it satisfy?"

It makes no difference how many bearings a motor has, how large its valves, how well designed its camshaft, its cylinders, its pistons, its crank case construction, or its oiling system, the quality or finish of its parts, if it does not satisfy.

In fact nothing matters, no superiority in any one part is of particular value unless the complete unit satisfies.

Thus it is that all the energies of the G. B. & S. Organization are focused on one point, the building of only one type and size of motor—a motor that will permanently **satisfy** the ultimate buyer.

It will be perfectly clear that having no other model to fall back on, no other type to shift to, we simply must see that each G. B. & S. motor **does** satisfy.

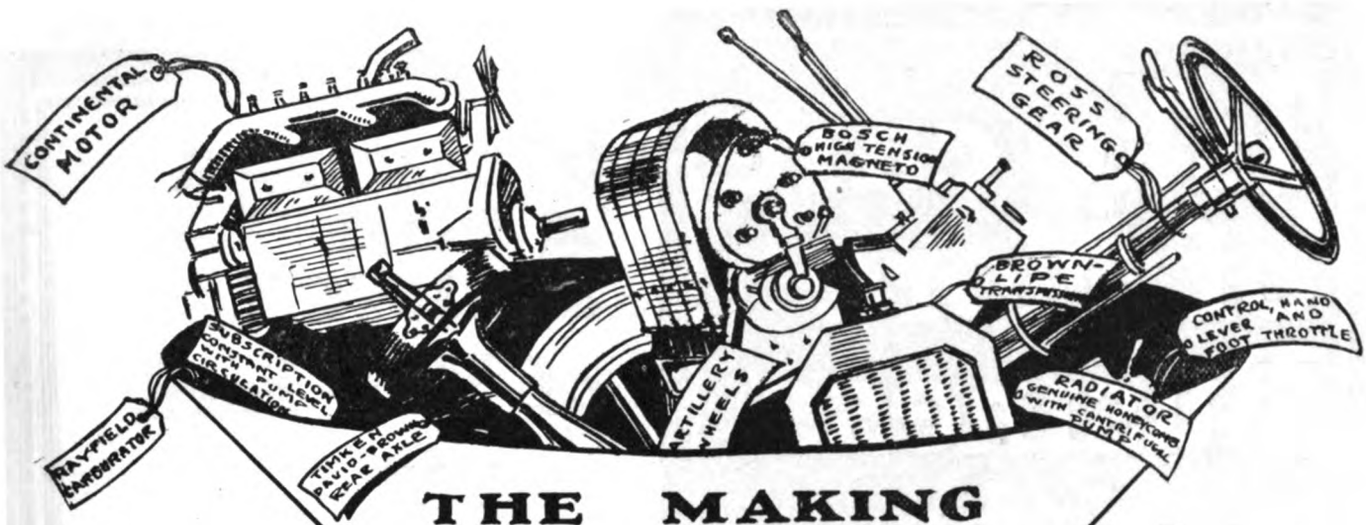
And that's exactly what we are doing.

The G. B. & S. motor is described briefly below the cut. If you can use a motor of this type, we suggest immediate correspondence outlining your possible requirements.

Golden, Belknap & Swartz Co.

Detroit, Mich.

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THE MAKING of a BESSEMER TRUCK

The component parts of Bessemer Trucks are conceded by the engineers of the commercial vehicle industry to be the product of the leaders in this industry. From radiator to tail light we use only the product of the *acknowledged* leaders.

Our skill in assembly has come from years of experience. Our engineers and machinists work together and under the careful supervision of trained experts and cautious inspectors we produce a line of trucks that will show better results in comparative tests than any other vehicles of equal capacities.

The man who employs motor vehicles in his delivery service whether he be contractor or merchant, will get better results. effect greater economies and have more dependable transportation facilities with our trucks than with any other in the United States.

We Stand Ready to Prove This

Your request for information will bring you the indisputable evidence of the truth of our claims.

One-Ton—Internal Gear Shaft Drive—$995
Two-Ton—Worm Drive—$2200
Three-and-One-Half-Ton—Worm Drive—$3100

DEALERS—Write us NOW for our liberal selling plans. We give interested factory co-operation and enterprising aid to our dealers.

All inquiries regarding territory in New England. Eastern New York, Eastern Pennsylvania, New Jersey, Delaware, Maryland, Virginia and District of Columbia should be addressed to our Eastern distributors:



MODEL D 2 TON CAPACITY—$2200

BESSEMER MOTOR TRUCK CORPORATION

Lexington Avenue and East 42nd Street NEW YORK CITY

All other inquiries to

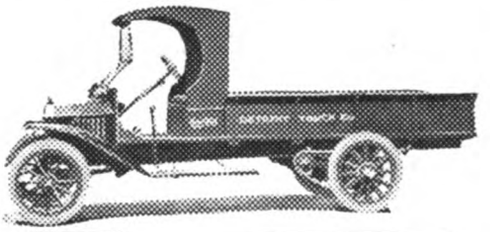
BESSEMER MOTOR TRUCK COMPANY, Grove City, Pa.

PLEASE MENTION THE COMMERCIAL VEHICLE WHEN WRITING TO ADVERTISERS

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Take care of More Business with the Same Upkeep

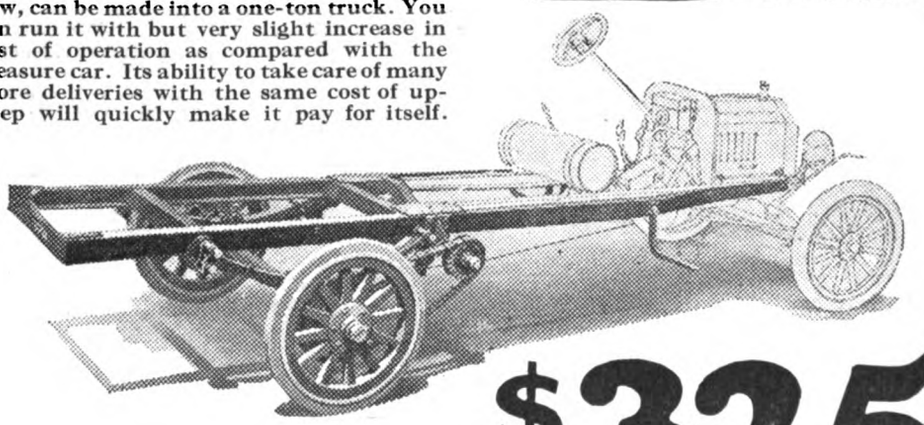
by making a 1 TON TRUCK of Your Ford



Tonford

TRADE MARK

With the TONFORD unit, any Ford, old or new, can be made into a one-ton truck. You can run it with but very slight increase in cost of operation as compared with the pleasure car. Its ability to take care of many more deliveries with the same cost of upkeep will quickly make it pay for itself.



$325

F. O. B. DETROIT

Drygoods merchants, wholesalers, laundries, etc., who have been in the habit of using three or four light Ford delivery cars are now taking care of more business with much lower operating cost by using one or two TONFORDS.

No matter what your delivery or transportation problems may be, consider the advisability of investing in a TONFORD before paying the greater initial cost, as well as the greater maintenance cost, of an ordinary one-ton truck.

The TONFORD unit fits on the frame of any Ford car, converting it into a one-ton truck with a 127-inch wheelbase and a loading space of from nine to eleven feet back of the driver's seat, and up to six feet wide, depending on the style of body.

The TONFORD sells for $325.00. You can now buy a new Ford Chassis for $325.00. The TONFORD truck unit is easily attached without changing the chassis in any way. Simply drill four holes and bolt the two frames together and you have a dependable one-ton truck with the Ford ease of control and economy of operation.

Dealers: We want representation everywhere. This is surely the "universal" truck. We are making prompt deliveries. Get in touch with us at once.

DETROIT TRUCK COMPANY, DETROIT, MICH.

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Ames Transfer Company's Pierce-Arrows paid for themselves by economies effected

This well-known New York contracting company bought in July, 1911, the second Pierce-Arrow 5-ton truck that was offered for sale. At the time of this purchase they had forty mules and a variety of wagon equipment which have since been replaced by trucks. The first ten Pierce-Arrows of the present Ames fleet of twenty-five were entirely paid for out of operating economies effected by the trucks added to the sum obtained by the sale of wagon equipment and mules.

To say that the Ames officials are satisfied with this showing is to put it mildly. They figure that they have obtained a large part of a new and efficient motor transportation system absolutely without expense.

During certain rush periods in their work they have rented trucks of various makes other than Pierce-Arrow. They were naturally interested in the comparative showings made in competitive tests of this kind, and they report that the Pierce-Arrow trucks have invariably proved by far the most efficient and economical.

Some of these Pierce-Arrow trucks of the Ames Transfer Company have already run well over 50,000 miles, and it is interesting to note that no perceptible wear has yet been observed in the worm-gear.

THE PIERCE-ARROW MOTOR CAR COMPANY
BUFFALO, N. Y.

PIERCE
PIONEER WORM DRIVE

The Worm-Gear

All Pierce-Arrow Trucks are equipped with the worm-gear drive, which is a positive guarantee of effective service under the most difficult conditions.



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GMC
GENERAL MOTORS COMPANY
TRUCKS

The Ever Widening Circle of GMC Dealers

is proof of the ever increasing popularity of GMC trucks.

A complete line of trucks, including worm and chain drive.

Trucks of highest quality and attractive design.

Trucks of greatest pulling power and low up-keep cost.

Trucks at moderate prices.

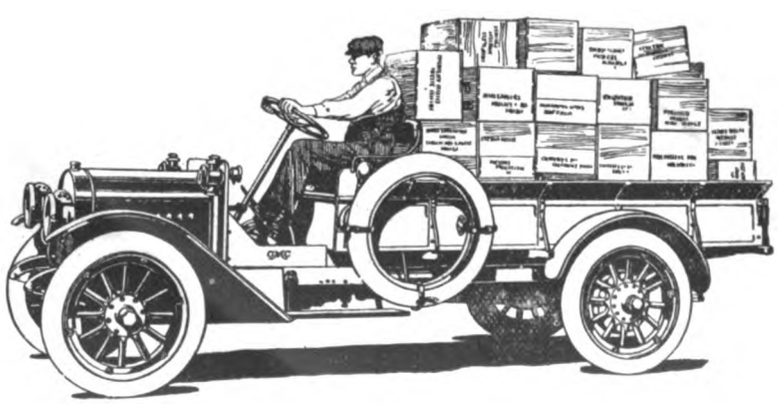
Trucks that are easy to sell.

These features and a liberal contract explain why the GMC proposition attracts the highest class of dealers.

The GMC agency is an asset worth while.

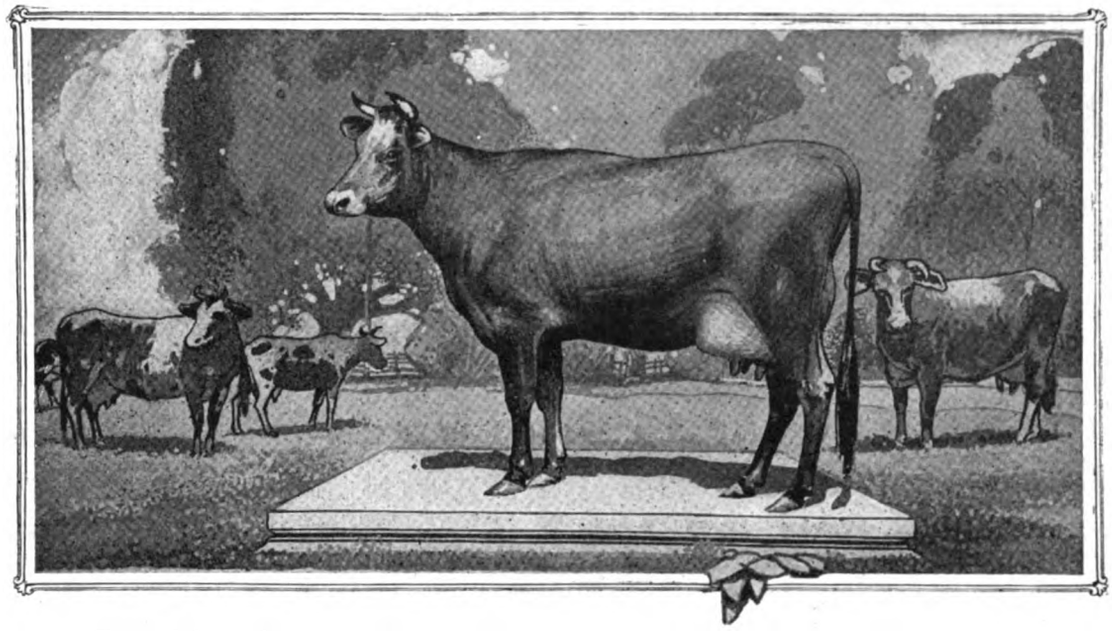
A big national advertising campaign is just starting. If your territory has not been taken there is no better time than now to ask for our proposition.

GENERAL MOTORS TRUCK COMPANY
One of the Units of General Motors Company
PONTIAC, MICHIGAN (99)
Direct Factory Branches: *New York, Boston, Chicago, Philadelphia, St. Louis*



PLEASE MENTION THE COMMERCIAL VEHICLE WHEN WRITING TO ADVERTISERS

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Consider the cow.

In striking contrast to the ordinary cow of scrub, runt or mongrel breed is the pedigreed, full-blooded, pure-bred whose prize-winning qualities set the standard for all others.

Consider motors.

Motors of many kinds are made by manufacturers of automobiles and trucks. They vary in many vital respects, according to the fancy of the designer or in response to someone's idea of what the public wants.

Consider the Continental Motor.

The slowly perfected product of many years, the result of many minds working toward a common aim, it sums up all the best motor experience of our generation. It has been chosen by more than 150 manufacturers of automobiles and trucks—frank acknowledgment that it equals or exceeds any motor they themselves could build. It is, in short, America's *standard* motor.

CONTINENTAL MOTORS COMPANY

OFFICES: Detroit, Michigan
FACTORIES: Detroit, Muskegon

Largest exclusive motor manufacturers in the world



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Model H, 1500 pounds capacity
$1225 (chassis) cash, f. o. b. factory



Model F, 2000 pounds capacity
$1500 (chassis) cash, f. o. b. factory

The new line of International Motor Trucks, two models of which are illustrated on this page, is seeking live distributors and wide-awake dealers in all unoccupied territory.

Can we do business with you on this basis?

International Motor Trucks are strictly modern, up-to-date in every respect, the best built motor trucks in America, regardless of price.

This new line is built in sizes that meet the requirements of over 80 per cent of motor truck buyers.

No truck gives the buyer more value for his money, or is easier to sell.

The Company that makes them is responsible and dependable to the highest degree.

International Motor Trucks are extensively advertised, both generally and locally, in the dealer's territory. No company could possibly co-operate more fully with the dealer than we do to make his work successful and profitable.

Our dealer arrangements are extremely liberal.

This year we have sold every truck the factory could turn out, without taking a single war order. Next year the factory output is to be more than doubled. By coming in with us now, you will share in the profits of our best year so far.

The best territory is being taken rapidly. Later on the opportunities will be limited. Now is the time to come in and grow with us. Please wire or write us so that we can lay our whole selling plan before you.

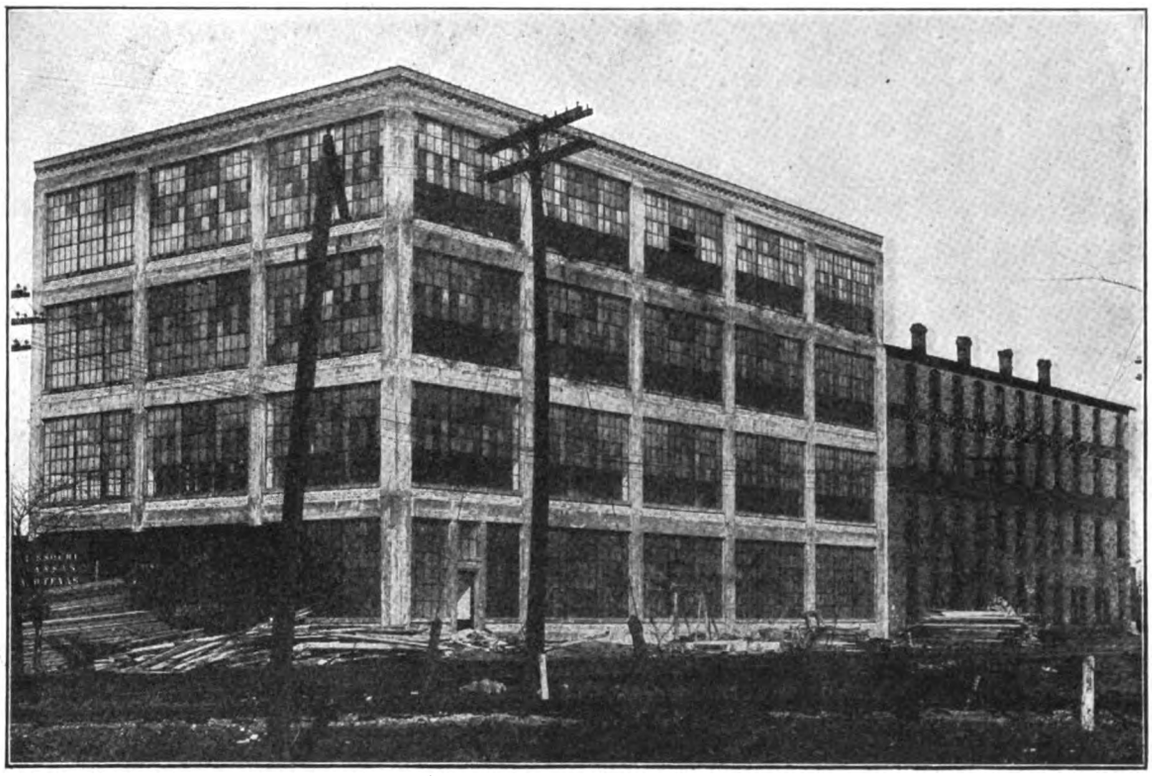
Motor Truck Department

International Harvester Company of America
(Incorporated)

88 Harvester Building **Chicago U S A**

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FULLER PREPAREDNESS



New Modern Plant **New Modern Machinery**
Five Times the Output

We Are Ready to Take Care of More High-Grade Truck Builders—¾ to 2 ton. *Highest Quality Only.*

WRITE

FULLER & SONS MFG. CO.
KALAMAZOO, MICH.

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GURNEY GURNEY

Unequaled Exactness and Accuracy of Race Contour

It is this feature of Gurney construction that enables Gurney Ball Bearings in actual practice to live up to their great theoretical possibility.

For, no matter how many balls, and of what size, you assemble in your bearing, and no matter how full depth or uninterrupted the raceways may be, the whole unit fails if there is the slightest inaccuracy or inexactness in the contour of the raceway.

By the term "exactness of race contour" we mean the degree of closeness with which the contour of the raceway may approach the contour of the ball. If the contour of the raceway be too great in its relation to the contour of the ball, then capacity is sacrificed, for the ball bears upon the raceway with too little surface.

If the contour of the raceway approach too closely that of the ball, excessive friction offsets the carrying capacity.

There is a happy medium in which contour of raceway and contour of ball so approach each other as to give the minimum of friction with the maximum of capacity. Faithful adherence to this condition of exactness insures both capacity and efficiency in Gurney Ball Bearings.

By the term "accuracy" we mean, of course, the machining and grinding, within size limitations, that approach as nearly to perfection as is humanly possible. Through the use of specially designed machines the Gurney Ball Bearing Company is able to hold these operations to such microscopic limits as are commercially impossible in any other bearing.

GURNEY BALL BEARING COMPANY
Conrad Patent Licensee
Jamestown, New York
Chicago, Ill. **New York City**

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Which Are You?

Service is success.

Your competitor, Slow & Company, can buy and sell the same merchandise.

You must beat him on service.

Trade now-a-days goes to Speed & Company.

Are you equipped for speed?

An Overland Delivery Car will enable you to go faster, farther, for a better, bigger business.

Nothing else at anywhere near the price is so efficient—or does you so much credit.

The Overland Delivery Car has the style, power, snap and speed.

It comes complete, electric starter and all—the best known, best rated car of its kind at anywhere near the price.

Speed up your business.

The Overland dealer in your town will help you.

Write us for catalog and full information. Please address Dept. 191

The Willys-Overland Company, Toledo, Ohio

"Made in U. S. A."

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OFFICE OF THE CHAIRMAN

FEDERAL TRADE COMMISSION
WASHINGTON

htc

July 11, 1916

Mr. M. C. Horine,
Associate Editor, The Commercial
Vehicle, 239 West Thirty-ninth
Street, New York, N. Y.

Dear Sir:

I want to thank you very much for your kind favor of July 7th. I note that you are sending under separate cover a copy of "The Commercial Vehicle Standard Cost System for Motor Trucks." As soon as this is received I will look it over personally and then turn it over to our expert. I am sure, however, it will prove very helpful.

It is certainly very encouraging to find trade papers like your own devoting special efforts in this direction. Of course, this is really a constructive work which is sure to help business; and if we can help business, it will help not only your paper but all other similar publications.

Again thanking you for your interest in this matter, believe me,

Very truly yours,

(Signed) *Edward N. Hurley*

Chairman

FEDERAL TRADE COMMISSION
WASHINGTON

JOSEPH E. DAVIES, CHAIRMAN
EDWARD N. HURLEY, VICE CHAIRMAN
WILLIAM J. HARRIS
WILL H. PARRY
GEORGE RUBLEE
LEONIDAS L. BRACKEN, SECRETARY

ADDRESS
FEDERAL TRADE COMMISSION
IN REPLYING PLEASE QUOTE

August 17, 1916

Mr. M. C. Horine,
Editor, The Commercial Vehicle,
239 West 39th Street,
New York City

Dear Sir:-

I have your letter of August 9th and in reply take pleasure in advising you that our experts have gone over your plan and in their opinion it is quite complete and very logically designed. It is, however, more of a record of costs than a cost accounting system.

With best wishes for the successful introduction of your plan, I am

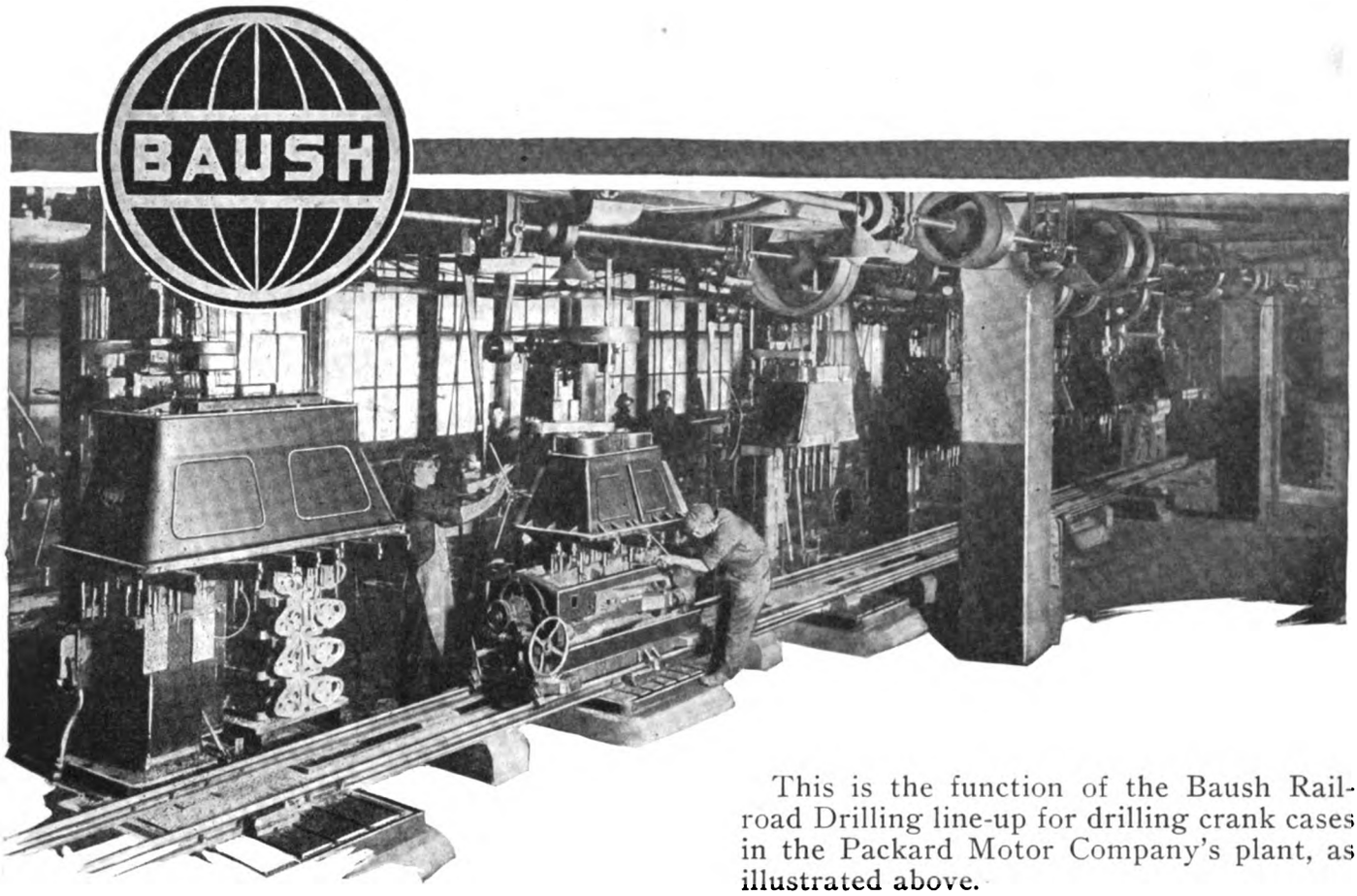
Very truly yours,

(Signed) *Edward N. Hurley*

Chairman

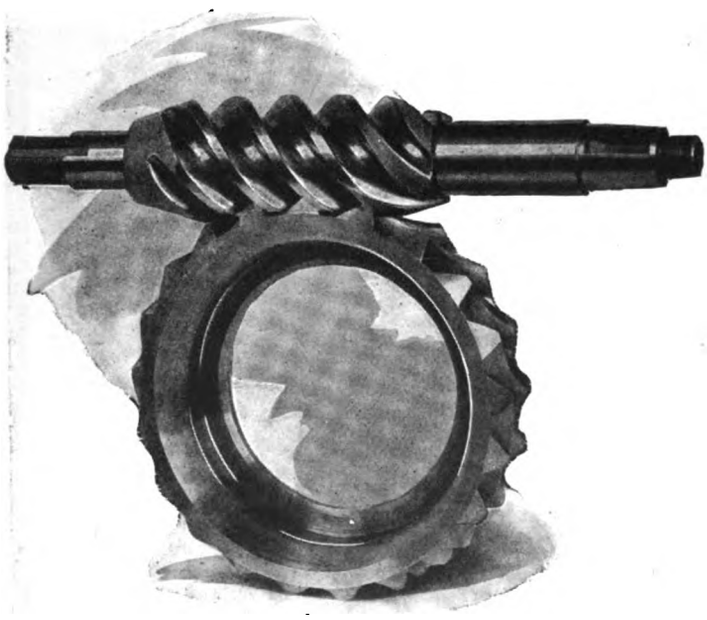
B-Tm

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This is the function of the Baush Railroad Drilling line-up for drilling crank cases in the Packard Motor Company's plant, as illustrated above.

Boring and turning about 200 holes, varying in size from ⅛" to 5½" in diameter



The layout consists of a number of standard multiple drills placed in a straight line with the jig mounted on a car and arranged to turn over so that the various holes can be reached.

All the machines are standard tools and so adjustable that a change of layout does not affect the machine equipment.

The extreme flexibility of the layout is indicated by the fact that one or a dozen jigs may be operated at a time, thereby insuring maximum production.

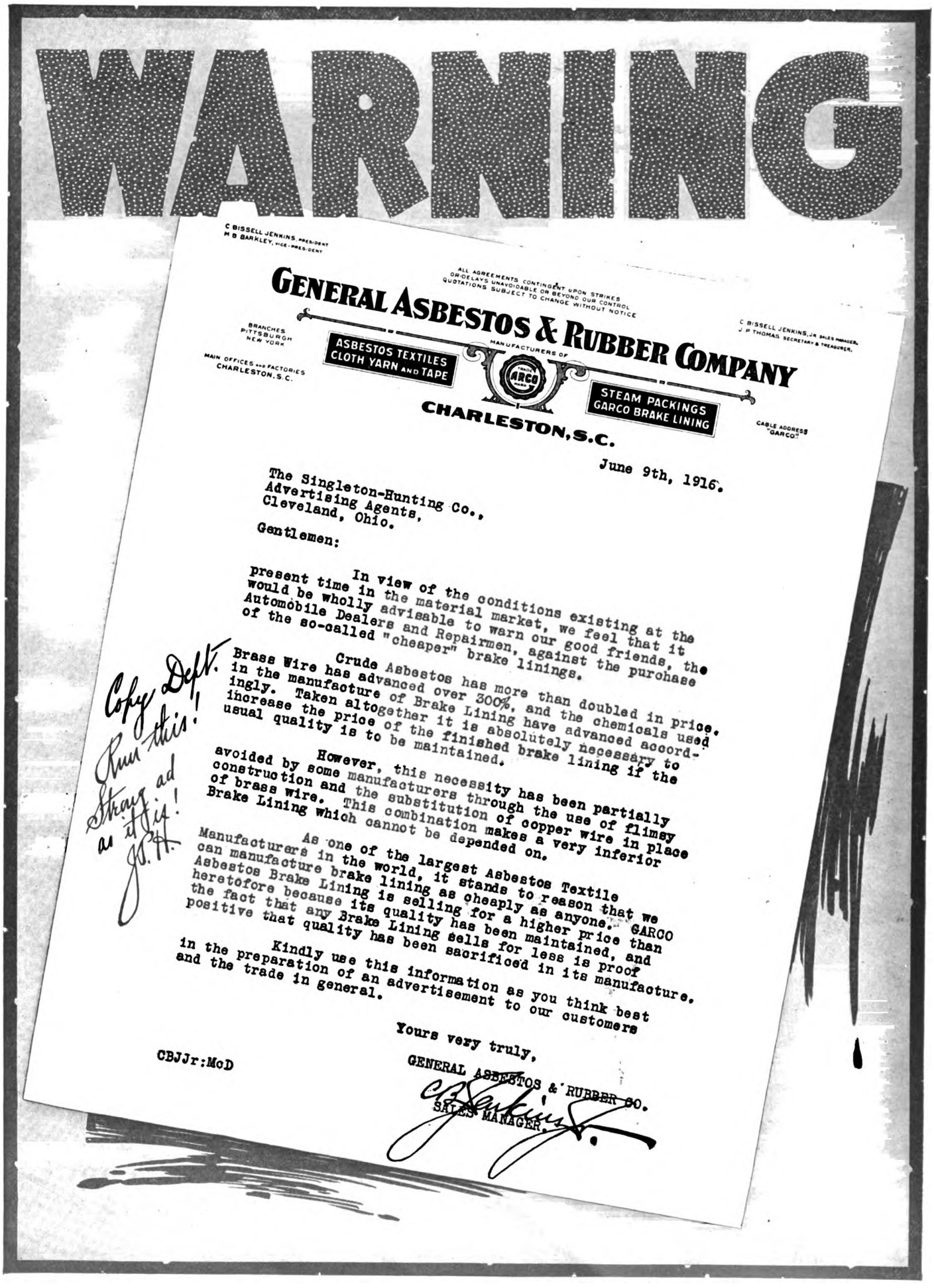
The first machine shown in this line-up is a regular No. 4 machine provided with a rectangular head which can be made in various sizes up to 20 x 40 in. and which can carry as many as 40 spindles. Each spindle is provided with a vertical adjustment controlled by a screw on the extreme outer end of the arm.

As in all of our latest types, the arms can be adjusted to centers equaling the diameter of the spindle nose, inasmuch as there are no projections on the inner end of the arm. All thrusts are taken care of by ball bearings and the machine is provided with an automatic feed stop.

Baush Machine Tool Co.

Springfield, Mass., U. S. A.

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Every Line of Business Has Haulage Problems Unique to Itself

DIAMOND T MOTOR CAR CO
DIAMOND
CHICAGO. ILL. U.S.A.

Due to Certain Constructional Features and Unusual Economy of Operation and Maintenance, DIAMOND T Motor Trucks Are Adapted to an Extremely Wide Range of Usefulness. They Show a Gratifying Margin of Profit Over Horse Haulage in Practically Every Instance.

Write for full information



DIAMOND T MOTOR CAR COMPANY, Chicago, Illinois

Distributors: Diamond T Motor Truck Co. of New York, 245 W. 55th St., N. Y. City; E. B. Olmsted, Buffalo, N. Y.; Pittsburg Saxon Co., Pittsburgh, Pa.; John H. Ryan, 495 Broadway, Milwaukee, Wis.; Brown Camp Hardware Co., Des Moines, Iowa; Hudson Phillips Co., St. Louis, Mo.

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Acason Motor Truck Co.
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Brockway Motor Wagon Co.
Burford Co., H. G.

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Dominion Motor Truck Co.
Dorris Motor Car Co.
Drednot Motor Truck Co.

Federal Motor Truck Co.

Gabriel Auto Co.
Garford Motor Truck Co.
Gary Motor Truck Co.
General Motors Truck Co.
Gerlinger Motor Car Co.
Gramm-Bernstein Co.

Hahn Motor Truck & Wagon Co.
Hanger, C. F.
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Hurlburt, M. T. Co.

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International Motor Co.

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Larabee-Deyo Motor Truck Co.
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Lombard Auto Tractor-Truck Corp.

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Mogul Motor Truck Co.
Moreland Motor Truck Co.

National Steel Car Co.
Nelson & LeMoon
New England Truck Co.
Niles Car Mfg. Co.

Old Reliable Truck Co.

Packard Motor Car Co.
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Peerless Motor Car Co.
Power Co., D. F.

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Royal Motor Truck Co.

Sandow Motor Truck Co.
Schacht Motor Truck Co., G. A.
Selden Motor Vehicle Co.
Service Motor Truck Co.
Signal Motor Truck Co.
South Bend Motor Car Works
Standard Motor Truck Co.
Stegeman Motor Car Co.
Sterling Motor Truck Co.
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Tait Bros.
Tegetmeier & Reipe
Tiffin Wagon Co.
Towar Motor Truck Co.
Transport Tractor Co.

United Motor Truck Co.
Universal Service Co.
United States Motor Truck Co.

Veile Engineering Co.

Way-Cleanse Co.
Ward Motor Vehicle Co.
Wichita Falls Motor Co.
Wilcox Motor Truck Co., H. E.
Wilson Co., J. C.
Witt-Will Co.

Zeitler, Lamson Co.

They All Use Worm Drive

WHY?

Certainly not because of its price, for its initial cost is higher than any other type of drive.

Not because it was the easy thing to do, for it necessitated changing from another type.

No! The plain, undisguised fact of the matter is that these manufacturers—the very cream of the trade, as you can see by looking over the list—changed to Worm Drive because it is the most efficient under any and all circumstances—and for no other reason in the world.

SHELDON

How quickly they changed, once having seen the light, is illustrated by the fact that in 1913 only 1% of American trucks were worm driven, while in 1916 over half of the cars actually produced used the worm drive.

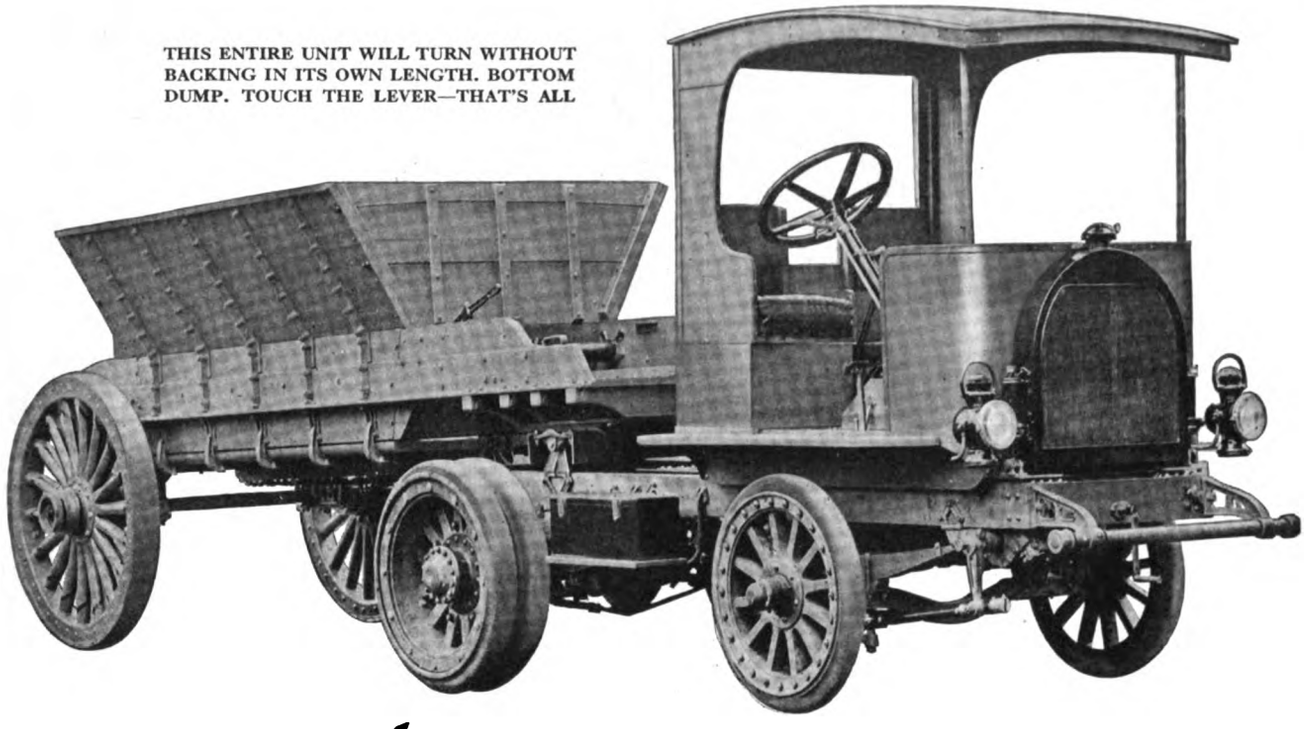
Now it is reasonable to suppose that all these manufacturers—comprising the most successful in the industry—are wrong?

The Sheldon Axle & Spring Company

Wilkes-Barre **Pennsylvania**

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THE 100% WATSON



THIS ENTIRE UNIT WILL TURN WITHOUT BACKING IN ITS OWN LENGTH. BOTTOM DUMP. TOUCH THE LEVER—THAT'S ALL

Announcement

"THE 100% WATSON" TRACTOR AND TRAILER, for contractors' use, represents a remarkable achievement toward the solution of the contractors' transportation problems—problems which this Company has been foremost in solving for the last twenty-seven years.

It Is a Bottom Dump and Turns In Its Own Length

"THE 100% WATSON" Tractor and Trailer contains many other entirely original and unique features which are bound to make it the "standard" in the motor equipment field just as the famous Watson Dumping Wagon is now the "standard" among contractors' horse-drawn equipment.

Our new catalog describing "THE 100% WATSON" Tractor and Trailer, and the many ways in which it will reduce your haulage costs, is about ready.

Send today for Catalogue "F"

WATSON WAGON CO.
CANASTOTA, N. Y.

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FEDDERS RADIATORS



WHEN we began making Radiators—19 years ago—we adopted our policy of "Quality First."

Knowing this to be our policy, and knowing our ability to live up to it, some of the leading car manufacturers have used FEDDERS RADIATORS from the very beginning.

Since then we have continuously added new customers and enlarged our output, but our policy remains unchanged, and our first patrons are still our patrons, after 19 years.

And numbered among them—and among the others who have since become believers in Fedders Quality and users of Fedders Radiators—are the makers of America's finest motor trucks and pleasure cars.

Aside from the dominance of Fedders Radiators in all ordinary branches of Motor usefulness, we are happy in being able to point to recent demonstrations of their proficiency in the racing field, under conditions calling for every good quality in superlative degree.

First and second places in the Astor Cup Race were won by Stutz cars equipped with Fedders stock radiators. Both cars broke the world's record, making over 102 miles an hour for 350 miles.

First in the Metropolitan Trophy Race at Sheepshead, May 13th, was captured by a Fedders-equipped Maxwell driven by Rickenbacher, who averaged better than 96 miles an hour for 150 miles.

And so it goes—

FEDDERS MANUFACTURING CO.
Buffalo, N. Y.

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Perhaps you're a Gramm-Bernstein dealer and don't realize it

If you are, you'd better begin to cash in on the profits

PERHAPS you're a Gramm-Bernstein dealer right now, with the push, the get-up-and-go to establish a live, growing truck business in your city.

If you can sell trucks—if you can get behind a real truck and work toward success—you're the right man.

If you possess the Gramm-Bernstein dealer qualities, sooner or later you'll be with us.

The Gramm-Bernstein truck and Gramm-Bernstein policy is surely and rapidly winning the best truck dealers in the country.

If you're Gramm-Bernstein timber you'll write us. Because you're awake to opportunity. You'll at least *investigate*, when a concern as old and sound and successful as the Gramm-Bernstein Company is says it has something special to offer.

We have. The Gramm-Bernstein proposition is *nothing ordinary*.

We will not give details here. We can say, however, that it includes:

Advertising in your home-town newspaper over your name.

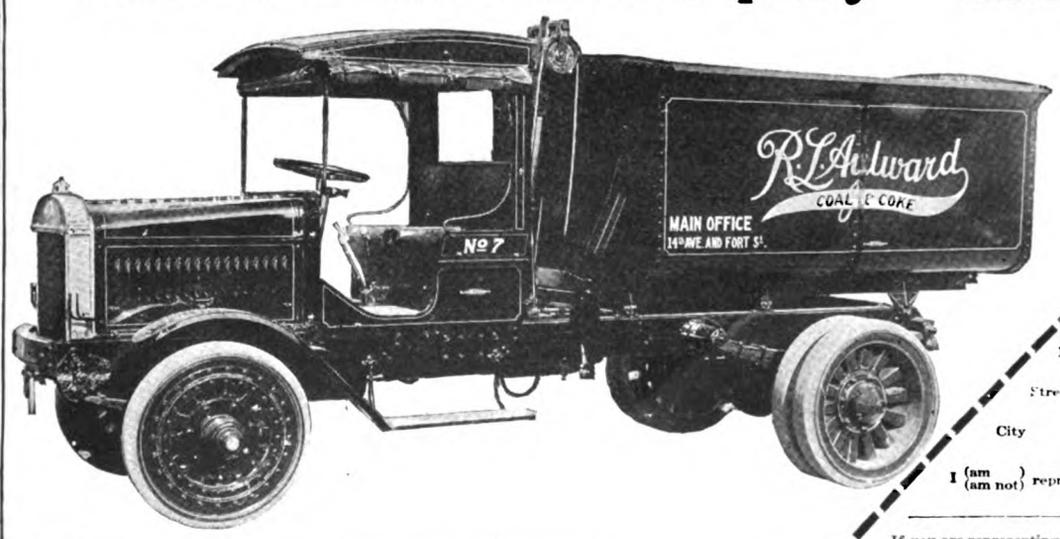
Sales service that backs your efforts to close a sale with the aid of some of the most successful truck salesmen in the country.

A truck that, as you probably know, enjoys a reputation second to none.

WRITE OR WIRE

Send a letter—the coupon at the bottom of this page—or a telegram. The quicker action the better. Territory is being assigned rapidly. If you're our kind of man, *let us know*. First applications get first consideration. Act—find out what there is *for you* in a Gramm-Bernstein Agency.

Gramm-Bernstein Company Lima, Ohio



Gramm-Bernstein Company
13 Gramm Blvd.
Lima, Ohio, U.S.A.

Please send me complete explanation of your new sales policy on Gramm-Bernstein Trucks, including reasons why it will pay me to handle the line, the advertising you will do for me in my local papers, the Dealer Sales Service, etc.

Name_____

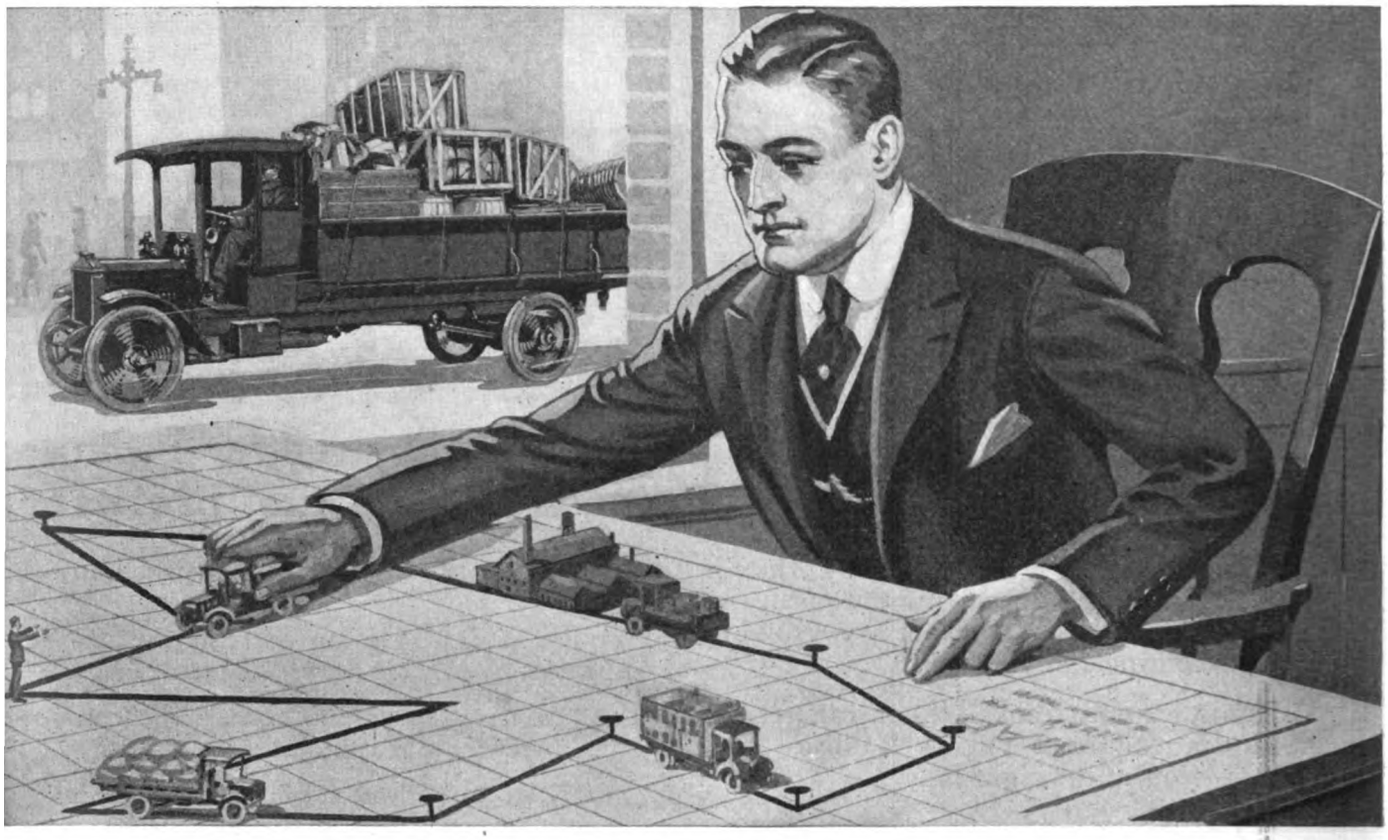
Street and No. _____

City _____ State _____

I (am / am not) representing a truck at the present time.

If you are representing a truck at present please give the name of it here.

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Reach out for New Customers

FEDERALize

Some firms close by you are struggling to keep up with deliveries.

Business is good—they could sell more if you could show them how to FEDERALize their haulage problem.

You can reach out with a couple of trips with a Federal—apply for them the routing idea and the sale is made.

Impress on every prospect that there is no truck built better than the Federal—none that outwears a Federal in the same work.

Federal Traffic Department has instances of Federal Economy in every line of business. Ask for them.

The Federal Motor Truck Co.

DETROIT, MICH.

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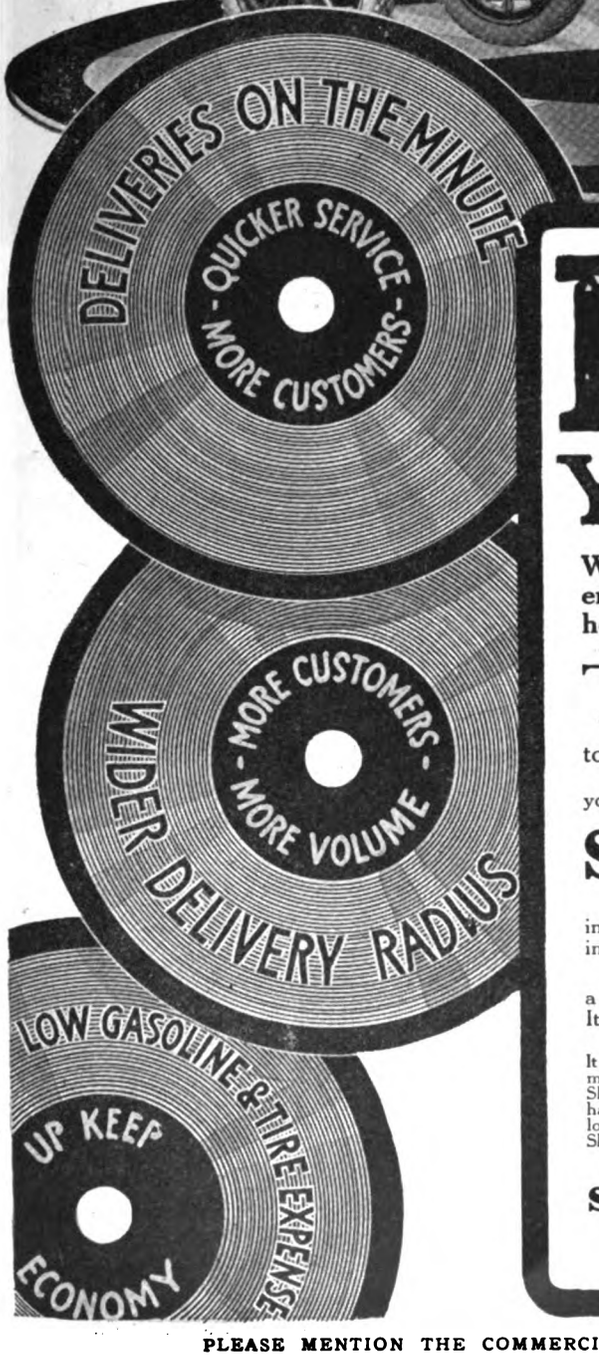
Price $540

Fully Equipped
F. O. B. Harvey, Ill.

Chassis $490

Adaptable for any style of open or closed body you desire.

Capacity 1000 Pounds



Records You-want-to-hear

What is your delivery problem? What are your delivery costs? What is your delivery radius? How many horses are you using now? Are they satisfactory?

THESE are all live, vital, absorbing and decidedly important questions. They must be definitely answered by every merchant or manufacturer who has merchandise, tools or supplies to haul or deliver.

So we are going to ask you to measure your delivery requirements—your hauling problems—against the

Sheridan Commercial Car

This light delivery car of a thousand pounds capacity is ample for hauling over 80% of all delivery jobs, yours and every other line of business included. It does the work of four horses easily, quickly, and at less cost.

Here is a light Commercial Car that is built to "stand up." It is not a makeshift. It is not an attachment. It is not a built-over touring car. It is not an experiment. It *WILL* deliver the goods.

Send for the SHERIDAN folder. Free of charge to any address on request. It will tell you just why the SHERIDAN is the high-water mark of economy in the Commercial Car field. It will show you just how no expense has been spared to make the SHERIDAN trouble-proof and fool-proof. It will show you just how the SHERIDAN'S half-ton capacity, mounted on a full ton chassis construction, gives you all you are looking for in delivery car power, service and economy. It will show you how the SHERIDAN will enable you to make the delivery "records *you* want to hear."

For prompt attention, address Desk 14

Sheridan Commercial Car Company
Sales and Display Rooms, 1509 So. Michigan Blvd., Chicago
Factory—Harvey, Illinois

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"The Spring Is the Thing"



MATHER

Scientifically Heat-Treated

SPRINGS

designed to insure

Maximum of Elasticity and Endurance

with

Minimum of Vibration

Genuine made only by

The Mather Spring Company

Toledo, Ohio

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HESS-BRIGHT'S CONRAD PATENTS ARE THOROUGHLY ADJUDICATED

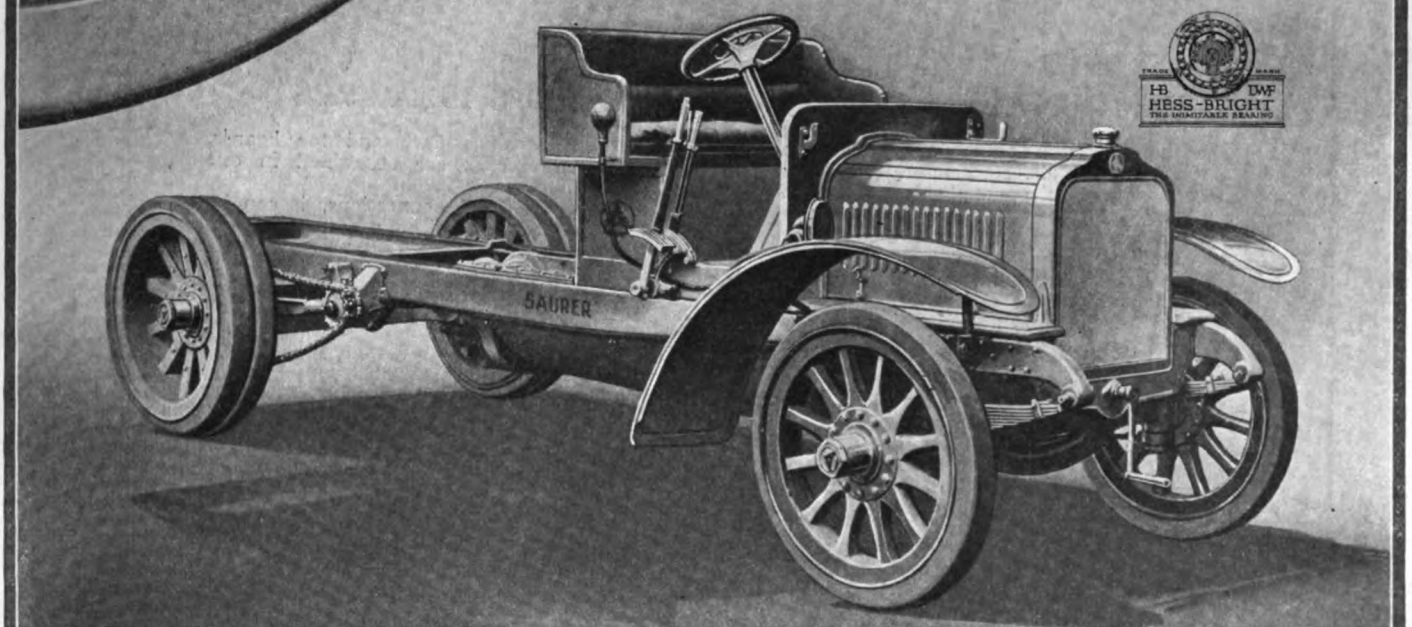
HESS-BRIGHT BALL BEARINGS

HAS IT EVER OCCURRED TO YOU that if the makers of a motor-truck choose HESS-BRIGHT BALL BEARINGS in preference to all other makes of bearings, it is done with the single purpose of giving the customer the best to be had, even though it increases the cost? The first cost of HESS-BRIGHTS is necessarily high.

The manufacturers of the SAURER TRUCK could easily substitute cheaper and inferior bearings, *but they won't if they can avoid it.* Their preference is HESS-BRIGHT BALL BEARINGS.

There have been instances since the beginning of the European conflict when we have not been able to supply our customers' requirements, but we are overcoming these difficulties by our rapidly increasing production.

The selection of HESS-BRIGHTS by the manufacturers of any motor vehicle is positive indication of earnest endeavor to build a purely quality product.

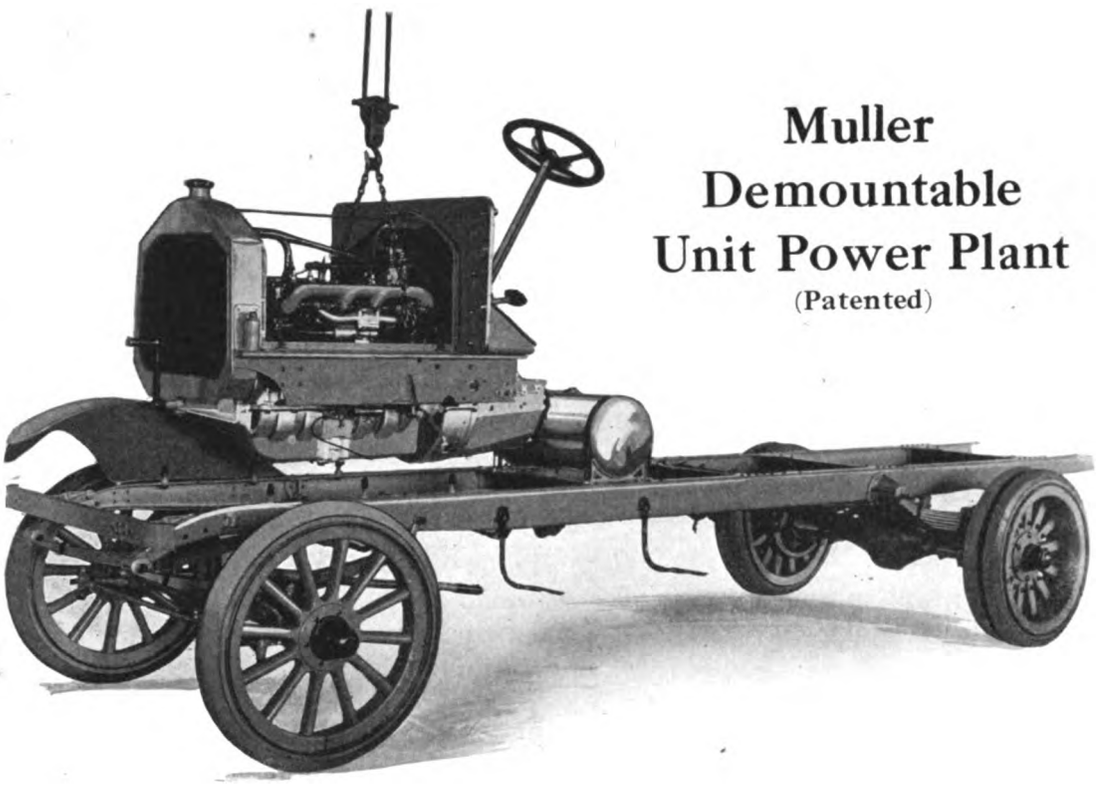


THE HESS-BRIGHT MANUFACTURING COMPANY
PHILADELPHIA, PA.

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MACCAR TRUCKS

The Car of Progress



Muller Demountable Unit Power Plant
(Patented)

DEMOUNTABLE POWER PLANT AND ITS FEATURES

The motor, clutch, transmission, radiator, pump, magneto, carburetor, dash and toe boards, brake and foot pedals, steering gear and all spark and throttle controls, are assembled in one cradle and as a Unit mounted into the frame.

By removing six (6) nuts, disconnecting drive shaft, brake and fuel connections, it can be removed and another Unit substituted in less than thirty (30) minutes, without disturbing the driver's seat.

The motor, clutch and transmission are in one assembly, known as the "UNIT CONSTRUCTION," mounted in the cradle on 3-point suspension and carried in dust-proof housing, covering completely fly-wheel and all running parts.

FOUR NEW MODELS FOR 1917

1—1½-Ton Worm Drive. 2½-Ton Worm Drive. 3½-Ton Worm Drive. 5½-Ton Worm Drive

The best selling line ever offered to live dealers.
Responsible and representative dealers wanted in all open territory.
Catalogs and full information furnished upon application.

MACCAR TRUCK CO.

SCRANTON PENNSYLVANIA

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The COMMERCIAL VEHICLE
Read by Business Men

Published on the first and 15th of every month
Entered as second-class matter, September 13, 1906, at the Post Office, New York, N. Y., under Act of Congress, March 3, 1879

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New York City

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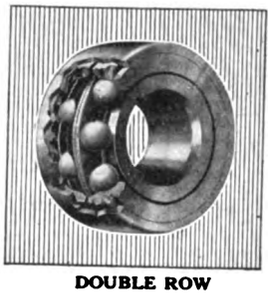
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Changes in copy for advertisements in the next issue to be in the office of publication not later than 10 days before date of publication

The cost and 

Increased of fuel lubricant can be practically offset by

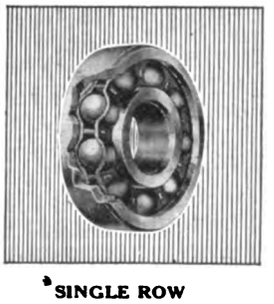
NEW DEPARTURE BALL BEARINGS

American Made for American Trade


DOUBLE ROW

The use of these bearings insures maximum power at the driving wheels and in proportion as the installation of New Departures throughout the working units of the chassis is complete, you will find the efficiency of your car increased.

How it is possible for New Departures to accomplish this result is most interestingly told by picture and text in our book entitled


SINGLE ROW

New Departure Ball Bearings, What they Mean to the Motor Car Owner.

Send for the Brown Book

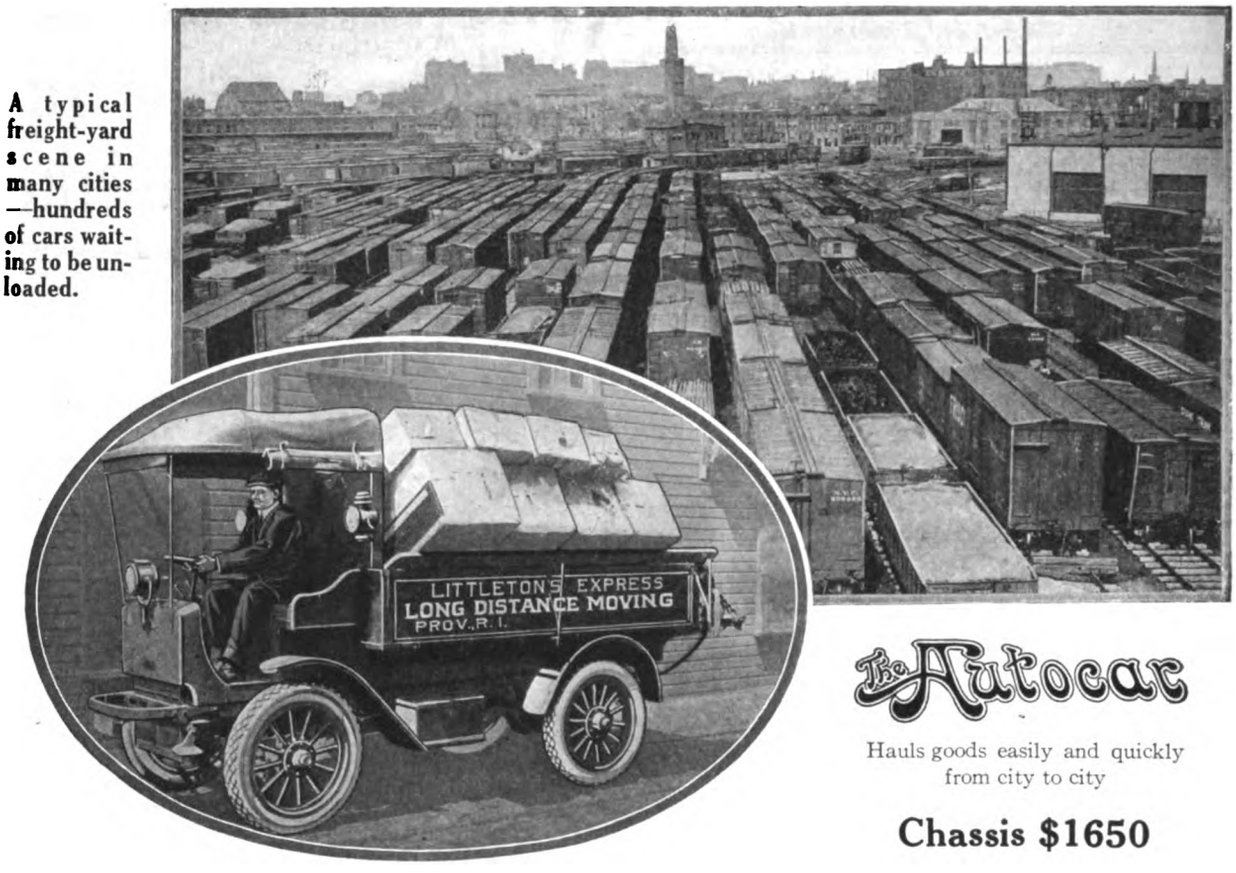
THE NEW DEPARTURE MFG. CO.
BRISTOL, CONN., U. S. A.

Western Branch: 818-20 Ford Bldg., Detroit, Michigan.
Distributors in Trade Centers throughout the United States.
Sole British Agents: Brown Bros., Ltd., London, Manchester.
Continental Europe: Jacob Holst, Copenhagen, Denmark.

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Many Houses Have Overcome Freight Congestion

A typical freight-yard scene in many cities—hundreds of cars waiting to be unloaded.



The Autocar

Hauls goods easily and quickly from city to city

Chassis $1650

IN NORMAL times, more than 4000 American business houses find the Autocar the most efficient and economical delivery vehicle. Now, when freight congestion is so acute, hundreds of concerns are using Autocars to carry goods from city to city.

The Nassau Smelting and Refining Company, of W. 29th Street, New York City, say:

"The freight congestion has been a serious handicap to us, but we have found a remedy. Recently it became necessary to send a consignment of material from our factory to a city 60 miles away. It was shipped by freight, and after being three weeks on the road was not yet delivered. The concern to which we shipped called us up and said it was absolutely necessary to have the material at once. We hired a motor truck, loaded some of the material wanted on it, and had it in our customers hands that afternoon. We then consulted the Autocar Company with reference to their trucks and placed an order with them."

Parteymueller & Gloekler, manufacturers of showcases and store fixtures, 3-5 Laight Street, New York City, say:

"A few weeks ago we were fitting up a large drug store in Germantown, Philadelphia, 90 miles distant. Showcases and fixtures were shipped by rail. When they arrived much of the glass was broken. It became necessary to send 4000 pounds of glass over immediately. The workmen were waiting for the material. Freight under present conditions would have probably taken weeks. We loaded the glass on our Autocar at 5 o'clock in the morning and it arrived in Philadelphia at the place of our contract early in the afternoon. The car was back in New York that night, ready for business the next morning."

Write for Autocar Catalog and list of users

THE AUTOCAR COMPANY, ARDMORE, PA.

Motor Delivery Car Specialists — Established 1897

Sales and Service Plants

New York	Chicago	Philadelphia	Boston	Baltimore
Newark	Providence	Los Angeles	Washington, D. C.	Atlantic City

Represented by Dealers at other points

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The COMMERCIAL VEHICLE
Read by Business Men
Vol. XV September 15, 1916 No. 4

Big Possibilities for the Motor Truck in the Inter-city Haulage of Freight

Can Perform Railroad's Short-haul Traffic at Less Cost and Give Quicker, Direct Deliveries with Less Damage

ONE of the motor truck's greatest opportunities is in the inter-city haulage of goods usually shipped by railroad as first-class freight. This opportunity has existed for many years and the present limited number of motor trucks in this service is not as large as the opportunities offered warrant.

Strike Threat Crystallized Opportunities

These opportunities were suddenly crystallized by the threatened railroad strike. If the railroad facilities had been only partly paralyzed, motor trucks would have been the most available means of transporting the vitally-necessary food products between the farms and cities and the haulage of all classes of goods between cities. The fact that the strike was averted, or at least postponed pending a governmental investigation, has not eliminated the truck's opportunity in the work of replacing the railroad for the short-haulage of first-class freight. It has simply made it impossible for the motor truck to gain the great impetus for its increased use which a railroad strike would have precipitated. If the strike had occurred as planned a great many trucks would have been put to work immediately, and it is almost certain that a large percentage of that number would have remained permanently in the service, even if the strike was of short duration.

The fact that the motor truck was the only available means for replacing the railroads for overland haulage was strongly brought out in practically all of the large cities which would have been affected, by the frantic efforts of manufacturers, growers of food products, milk companies and shippers to obtain blanket options from truck dealers and makers to obtain all of their immediately available trucks. In fact, in one city along the Atlantic Coast it was the opinion of one motor truck dealer that it would have been impossible to obtain a motor truck of any kind in that city forty-eight hours after the strike went into effect. Milk companies and produce dealers receiving their shipments regularly by rail made serious endeavors to obtain all available motor trucks to bring their goods into the cities by relays of trucks or drivers in order that their business might not be completely paralyzed. As reported in THE COMMERCIAL VEHICLE of Sept. 1, 1916, the city officials of Cincinnati, Ohio, and the commission merchants there obtained options on all of the available trucks to carry the products of the farmers and truck gardeners into the city. Many of these farmers combined for the purpose of buying or renting trucks to be used jointly by several of them.

Large Truck Increase Possible

While it is fortunate that the strike was averted and conditions bordering on a national calamity avoided, the mere threat of such action has sufficed to bring the opportunity of the truck in this work forcibly to the attention of truck owner, operator, manufacturer, agent and dealer. A great increase in the use of trucks in this service offers a great opportunity for the owner and operator, because it enables them to enter a large field where trucks can be profitably engaged. To the maker, agent and dealer the increased use of trucks in this particular work means larger sales and correspondingly larger profits.

Granted that there is such an opportunity for a vastly increased use of motor trucks in short-haul freight transportation between cities and the haulage of goods from the suburban areas into the cities, let us get down to brass tacks and endeavor to determine in just what particular field or fields this opportunity exists. If there are profits to be made in this work let us try to find out where and how these profits can be realized. Let us also endeavor to point out what is necessary for the successful operation of motor trucks in this particular class of work.

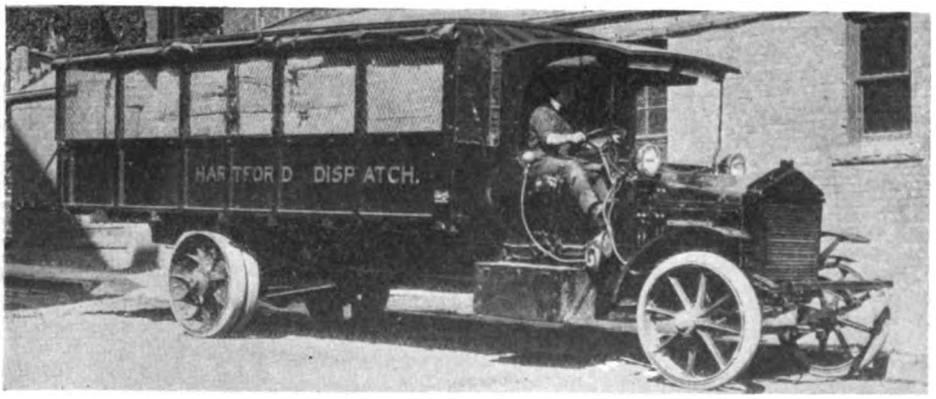
Cost Knowledge Imperative

A vital necessity to anyone entering into competition with the railroads in the transportation of short-haul freight is a knowledge of truck operating costs. This means all the costs—not merely the cost of the driver and helper per day, the cost of tires, the cost of gasoline and oil, repairs and garage rent, but also the overhead charges, the interest on investment, insurance, taxes, licenses and depreciation. The truck owner or operator must know what these mean and, what is still more important, how to figure them.*

It has been said that the reason that there are but few really large trans-

*The COMMERCIAL VEHICLE's Standard Cost System for Motor Trucks offers an easy means whereby a truck owner may readily calculate what his total costs are by simply following the instructions which form a part of each copy of the system. Blank lines are provided for filling in. All the necessary cost items are included so that if an owner follows the system diligently, he may know to a surety that the total cost as found is the actual cost—no more or no less.

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A 5-ton Pierce-Arrow used in the haulage of freight and express between Hartford, Conn., and Springfield, Mass., a distance of 26 miles. The truck and a 5-ton Packard owned by the same concern each make a round trip every night, 6 days a week, leaving Hartford at 8:15 p.m. and returning at 4 a.m. the following morning. As the American Express company does not enter Hartford the trucks are used mainly as feeders for that company, hauling goods from Hartford to Springfield. The trucks carry loads both ways, bringing back to Hartford shipments of bread and provisions for a chain of lunch rooms in addition to shipments of tires from a large Springfield rubber manufacturer

portation concerns in this country employing either horse or motor vehicles is due to the fact that the actual cost of operation of their vehicles is unknown. This results in rates too low to insure a reasonable profit, and this in turn results in a sort of hand-to-mouth business in which capital is not easily interested. Many of the horse transportation companies have been formed by a driver of a horse wagon who was perhaps started out in business by the man for whom his employer was doing the hauling. Chattel mortgages were held on both horse and wagon, and when these were worked off by the erstwhile driver the latter obtained additional credit from the same source for his second or third wagon. Then he decided to stop driving one of the wagons to watch the drivers of the remaining vehicles and in this way became the head of a transportation company. Men of this type are generally entirely ignorant of operating costs and, accordingly, the rates which they charge are usually too low to insure a reasonable profit. Rates which are not based upon an accurate knowledge of operating costs can only by chance be equitable for the work performed. They usually result in the receipts or income for the year being slightly more than the expenses or outlay, with a little left over for actual living necessities.

Lack of Cost Knowledge Prevalent

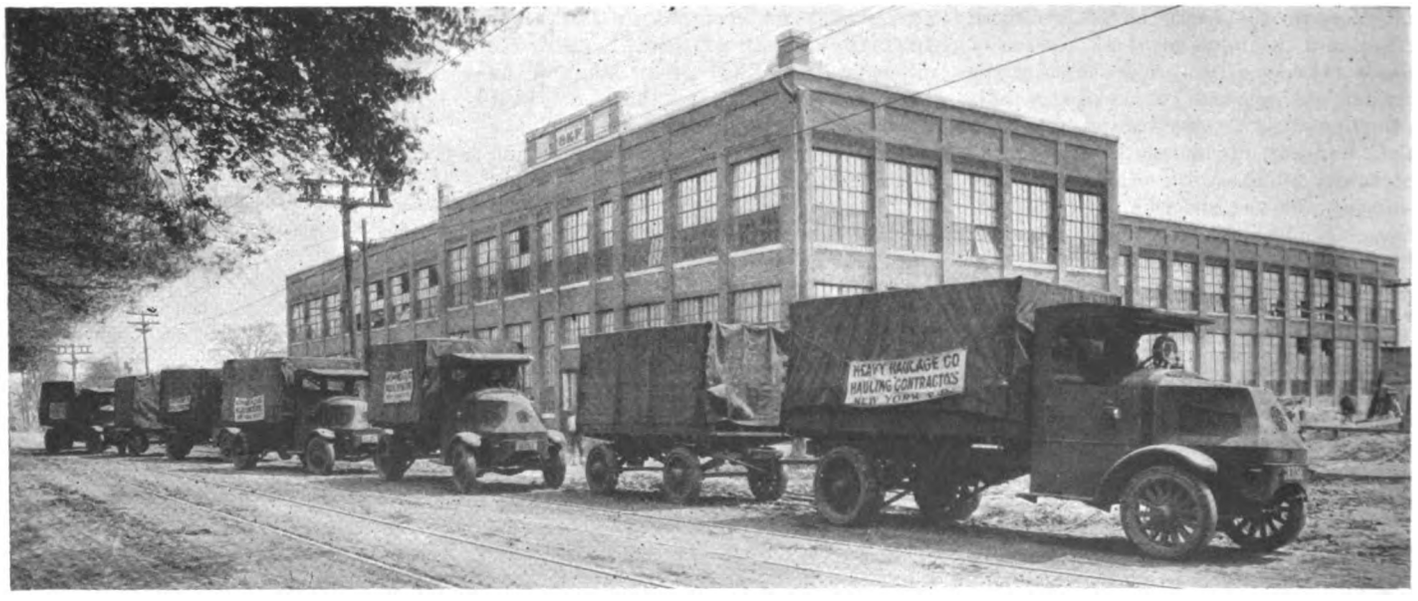
While it is not to be denied that there are many horse transportation concerns which know their operating costs to a penny, these appear to be in the minority, and their rates are naturally lower than they should be in order to meet those of companies that have not an actual knowledge of their costs.

It is true that the advent of the motor truck into the general haulage field has resulted in the formation of companies whose men are of a much higher grade of intelligence because of the greater investment required. It is strange, but nevertheless true, that even many of the latter concerns have no accurate knowledge of their operating costs.

Organization Insures Profits

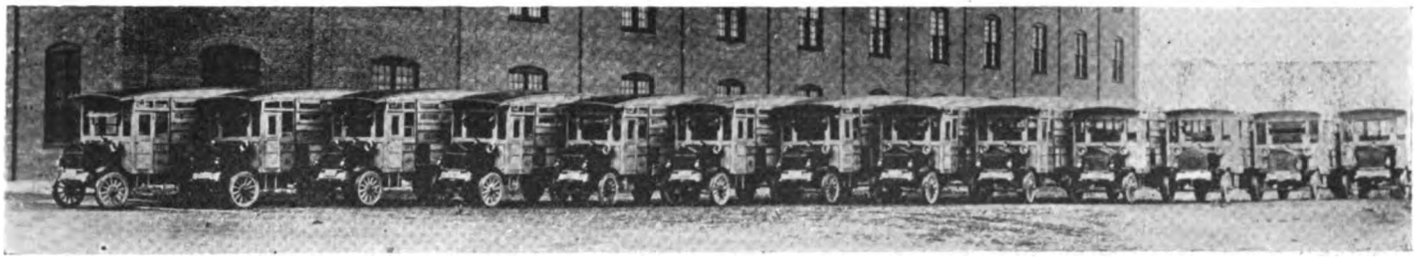
It is suicidal for such concerns as the latter to attempt to enter into competition with the railroads for short-haul freight traffic. It must be remembered that the transportation system of the average railroad in this country is highly organized. Likewise the system of a motor truck concern endeavoring to compete with it must be highly organized. This organization consists of determining exactly what it will cost to do the work and then fixing a rate which will insure a reasonable profit. That this is a vital necessity upon which depends the success of the company is borne out by a recent report of the United States Federal Trade Commission, in which it is pointed out that the great majority of business failures in this country are due to a lack of knowledge of costs—costs of manufacture, selling or transportation, as the case may be.

Cost of transportation is usually an item of importance in every business. It is only in recent years that appreciable progress has been made toward reducing the cost of motor haulage by the use of modern time-saving devices to enable the truck to be in actual motion the maximum part of the working day. In competing with the railroad for short-haul freight the time element is all-important. If an industrial manufacturer or shipper is not concerned whether his goods *en route* reach the destination this week or 2 weeks



Five 5½-ton Mack AC trucks and three 5-ton four-wheeled trailers owned by the Heavy Haulage Co., New York City, which hauled 40 tons of steel from New York City to the plant of the S. K. F. Ball Bearing Co., in Hartford, Conn., a distance by road of about 140 miles. The material, which came from Sweden, could not be shipped by rail because of the freight car embargo in force at the time. It was urgently needed to enable work to be started in the new S. K. F. factory. Trucks were the only means to get it there and they did, thereby saving the ball bearing company considerable losses

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A fleet of thirteen 2-ton Reo trucks recently driven overland from the plant of the Reo Motor Truck Co., in Lansing, Mich., to the Transportation Service Co., Richmond, Ind., where the vehicles will be used in freight haulage in competition with two railroads and one interurban line. The Transportation Service Co., which is managed by Messrs. Freed and Jones, purchased its first truck 2 years ago and established a freight service on a time schedule between Richmond, Ind., and New Paris, Ohio. The success of the truck in the work resulted in the purchase of the fleet shown above and the establishment of additional routes

hence, the motor truck has small chance of competing successfully with the railroad in the haulage of any kind of freight over any length of route.

If, however, the time element does enter into the consideration, the motor truck has a decidedly favorable chance of competing successfully. Here again the subject of the length of haul and the character of the roads over which the trucks must operate, together with the particular class of freight to be handled, are factors which enter into the solution of the problem. Knowledge of the character of the roads is of much importance, because the cost of the truck operation is dependent to some degree on whether the roads are good or bad.

The Truck's Best Chance

The class of freight to be hauled—that is, the classification given it arbitrarily by the railroads—is of equal importance with the knowledge of truck operating costs, because the rates charged by the railroad are based upon the freight classification. The rates for first-class goods are naturally higher than those for lower classifications. The motor truck, therefore, stands the best opportunity for competing successfully by handling first-class freight on which the rates are the highest. The various freight classifications have been arbitrarily determined by the railroads to a certain extent, although in a broad sense first-class freight consists of those goods which would be hard to replace if lost or damaged. Included in this classification are wholly or partly manufactured commodities and all forms of perishable goods. Even the rates on first-class freight vary according to the amount of goods shipped, being higher on less-than-carload-lot shipments than on material which occupies an entire car. From these facts it is seen that the truck's best chance to compete successfully with the railroads is in the haulage of l.c.l. shipments of first-class freight.

But this is not all, for the length of the haul is a vital factor, and one which cannot be decided without a comprehensive study of each particular case. This study should determine if the goods as formerly shipped by railroad remain on the tracks of that road from the point of shipment to the destination or whether they have to be run over the lines of a second railroad. It should also be determined if the goods are loaded directly into freight cars on sidings at the point of shipment and similarly unloaded at the destination from other sidings, or whether hauls are necessary at both ends between the plants and the railroad yards.

Time Element Important

Here again the time element enters into the problem, and obviously the truck's chances for successful competition with the railroads are brighter when the goods as shipped by rail must be hauled to the railroad yard at one end of the route and from the yard to the destination at the other, than they are when the goods may be loaded and unloaded on sidings at the ends of the route. In the former case the use of the motor truck enables the entire transportation between the points of shipment and final destination to be performed in one operation—a door-to-door service. This service eliminates the costly delays often met with in getting goods to the freight cars at the sending end and getting the same out of them at the other end. It also eliminates the two intermediate handlings of the goods, thus tending to reduce the possibility of damage through breakage. Likewise, the separate haulage costs at each end of the route are eliminated, although, of course, they are partially included in the total cost of direct truck haulage. The cost of horse haulage from the shipping plant to the yard at one end and from the railway to the final destination at the other sometimes equals the cost of the haul by rail, especially on short-haul work when the length of route is less than 50 miles.

Seek Two-Way Loads

Another important consideration to be taken into account is the possibility of hauling goods both ways between the points of shipment and destination. If this can be arranged the rates for the truck haulage can be considerably decreased and in many cases placed at a figure much less than the railroad rates, besides giving a much superior service by cutting the time of goods in transit from 15 to 20 hours, even on short hauls between 15 and 20 miles.

Conditions Must Be Studied

From these deductions it is evident that the first requisite of a concern desiring to enter the business of intercity freight haulage is an accurate knowledge of its truck operating costs. It must then investigate the rail rates between the two cities between which it intends to operate and the cost of horse or motor truck haulage at each end of the route between the plants of the concerns with which it expects to do business. With this knowledge of what it costs those concerns to ship their goods by rail, plus the cost of the vehicular hauls at both ends, if these are necessary, together with its knowledge of what it will cost to operate its own trucks between the two cities, a trucking company could determine accurately just what its rates should be to insure a reasonable profit. Of course, questions of road conditions, grades and available means of rapid loading and unloading must be taken into account before the rate is definitely determined.

Big Time Saving by Truck

Even if the rate as calculated is higher than the combined rate of the railroad and the cost of vehicular haulage at both ends of the route, the motor truck still has an excellent chance to obtain the business if the element of time enters into the question, for on routes not more than the length of a maximum day's truck run the latter can save anywhere from 15 to 20 hr. as compared with the time the goods would have to be in transit by rail.

This element of time is becoming more and more important in all industrial plants and in the transportation of their materials. The use of trucks in the handling of goods between plants which can be reached within a day's run of the truck means not only a saving of time and a saving in the number of handlings, an important item if the material is fabricated products liable to damage through misuse, but also a decrease in the amount of goods in transit and a greater ability to fill rush orders quickly.

(*Continued on page* 20)

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War Transport an Engineering Job

THE army has accepted the example of commerce and nations abroad in adopting the motor truck for its transport work. Now let it take another chapter from the experience of both and learn how to operate it efficiently.

Business houses have not put stablemen, and overworked ones at that, at the head of their motor truck delivery departments. The European powers have not turned over their thousands of motor transport vehicles to their quartermaster departments. They have created a special corps, the mechanical transport department, whose sole duty is the transportation of supplies, etc., by motor vehicle and reporting direct to the general staff.

Perhaps, in the tardy stages of development, the army has not made a serious error in operating its motor trucks under the quartermaster department of the army, considering them as the equivalent of horse vehicles, even arbitrarily grouping them into companies of twenty-seven, as the wagon train regulations prescribed. So assigned, it is likely that more mistakes have been made in the operation of motor trucks than would have been the case had any other arrangement been made —and it is by making mistakes that most wisdom is attained.

Enough mistakes have been made and enough motor trucks have been worn out unnecessarily in Mexican service by now, however, to warrant a change in the status of the army truck. If we cannot have a mechanical transport department in our army, then let us at least relieve the long-suffering quartermasters of the burden of wrestling with the baffling problem of motor war transport.

Of all existing departments to-day, the engineer corps is the best fitted to operate motor trucks. It is the engineers who would operate railroads in time of war, not the quartermasters, although the railroads may be used for the haulage of supplies.

Motor trucks are but little used in quartermaster work. The quartermaster's work is to provide quarters and rations for the troops. For the transportation necessary to carry the baggage and equipment on infantry marches each regiment is provided with a company of twenty-seven wagons. These are normally mule-drawn. That is as far as transportation should concern the quartermaster.

Motor trucks are used mainly in the identical service to which railroads are applied in war—for the bringing up of supplies from the base to the advanced base, or from thence to the camp.

The work of operating such truck trains is largely an engineering one. It has to do with the operation of delicate machinery. It has to do with the building and maintenance of roads and bridges. It has to do with efficient traffic control.

Abroad the mechanical transport work is carried on with the precision of a great railroad system. Roads are not only built, but maintained in the best of shape and well policed to prevent violations of orderly traffic rules.

In Mexico our trucks are running on no roads at all, most of the time. They run over the desert alkali until ruts too deep for safe passage are made, and then a new set of ruts parallel to the first set are made. Only recently has any attempt been made to improve the condition of these roads, while millions in money was being wasted in truck depreciation and repairs needlessly occasioned by failure to provide roads.

In Plattsburg, where army officers were learning lessons in motor transport while instructing the rookie to shoot, the quartermasters labored with the trucks 16 hr. a day, while the engineers made pretty maps of cow pastures.

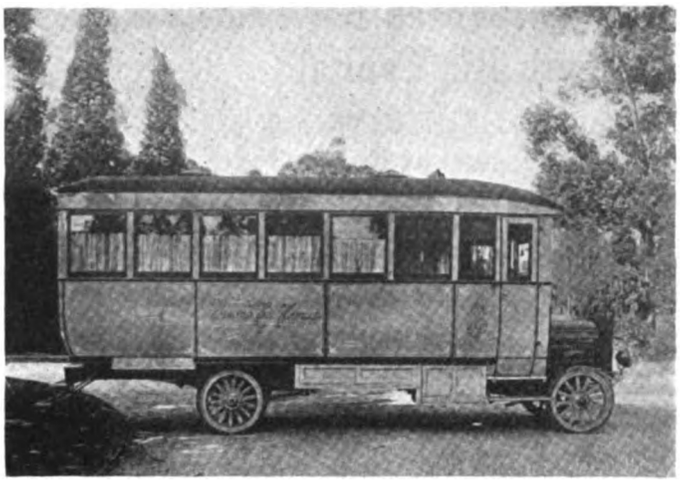
Now it is very necessary that maps shall be made in an active campaign, but it is also necessary that roads and bridges shall be made and that the mechanical transport equipment of an army shall be conducted efficiently.

The engineers should not make fewer maps, but they should do more practical engineering work besides. The quartermaster troopers should be set to quartermaster jobs and engineering jobs should be left to the Engineer Corps.

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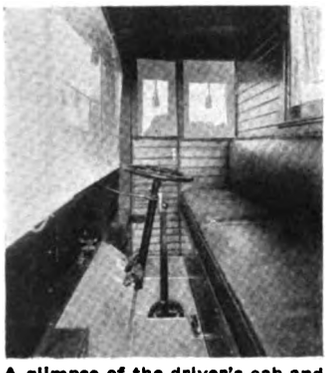
Luxurious Land Yacht Touring Pacific Coast

To Cross Continent Next Year



Note the land yacht's large window area and the driver's closed cab. The chassis employed is a 2½-ton Moreland

MRS. RUTH KOHLER of Fresno, Cal., is now touring northward from that city into Oregon in the most luxurious land yacht yet built on the Pacific Coast. It was constructed by the Moreland Motor Truck Co., Los Angeles, to comply with general instructions given by Mrs. Kohler, who outlined the conveniences with which she wished it equipped and gave orders to have it built in the best manner possible, regardless of expense. The land yacht has a body 18 by 8½ ft. mounted on a 2½-ton Moreland truck chassis of the regular worm-driven, distillate-burning type.



A glimpse of the driver's cab and the seat on which he sleeps

The driver's compartment forward is equipped across its full width with a broad, well-cushioned seat, on which he sleeps at night. He has a portable table on which his meals are served in his own compartment. The equipment of the interior of the yacht supplies the necessities and comforts of a complete home. At the front end, in the corner, is a toilet and shower bath; in the opposite corner are a sink and a wash bowl. The sink is normally concealed by a folding table used in the preparation of meals. There are six electric plugs, supplying means of operating several electric cooking utensils for broiling, toasting, making coffee, etc. Water is heated by an electric coil heater.



Note the four plugs for attaching electric cooking utensils



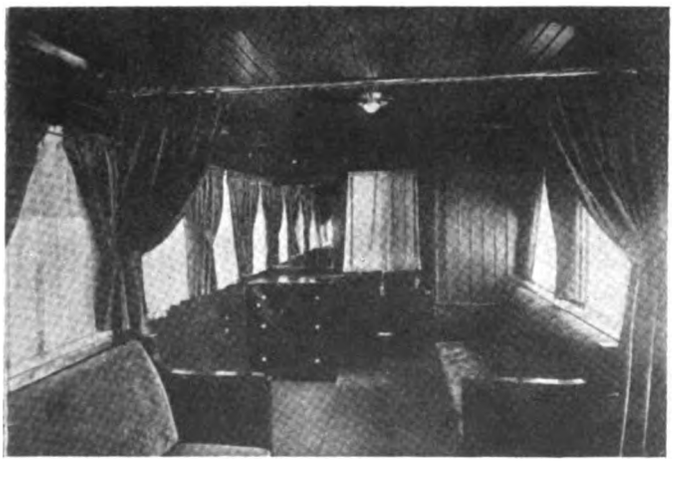
Modern conveniences — a light airy toilet and shower bath

Main Compartment Sleeps Four

In the center, which makes a fairly large open room, there are two folding Davenport beds. These when extended are full-sized beds, and close up into usual Davenport form, making comfortable seats in the day-time. Heavy plush carpet is on the floor and modern draperies adorn the windows. A portable mahogany dining-room table is supplied, the legs of which drop into sockets in the floor. In one rear corner is a built-in mahogany dresser with long plate-glass mirror, and in the opposite corner there is a built-in clothes closet with a hat compartment and all necessary equipment for hanging garments. All interior finish is of the finest selected mahogany.



The sink and washbowl are exposed by lifting a folding table leaf



The interior, looking toward the front and showing the two folding Davenport beds which are used for seats in the daytime

Running water is supplied to faucets within the car from a 50-gal. overhead tank. Electrical equipment includes an extra powerful dynamo run from the engine and a large storage battery carried in a battery box under the truck; the battery has sufficient capacity to handle the cooking and to light the car brilliantly. Plugs are provided outside from which drop cords may be run out into trees or a tent which is carried along to furnish electric light.

Compartments under the truck carry a complete camping equipment—tent, poles and stove—so the tent may be put up as a second room where a long stop is to be made.

At the rear of the truck is a mail box. When stopping in a town for several days Mrs. Kohler notifies the post-office of the location of her residence and mail is delivered in the box.

This year Mrs. Kohler expects to confine her touring to the comfortable jaunt north, but next year is planning to cross the continent.

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New Torbensen Formed with Big Capital

$895,000 of $1,750,000 Stock to be Issued at Present

CLEVELAND, OHIO, Sept. 1.—The Torbensen Axle Co., this city, has been formed with a total authorized capital of $1.750,000 to take over the Torbensen Gear & Axle Co., with its main plant now in course of completion on east One Hundred Fifty-second Street, this city.

Of the authorized capital $1,000,000 is preferred and $750,000 common, but only $500,000 of preferred and $395,000 are to be issued at this time. The $395,000 of outstanding capital will cover the taking over of the old company and will also provide $400,000 of new capital. This has been practically all disposed of at private sale, and there will therefore be no public offering of the securities.

This company has been located in Cleveland about one year, originally on east Seventy-second street, but more recently a 4-acre site was acquired on east One Hundred Fifty-second street. on which a large plant with 60,000 sq. ft. of floor space is now being completed.

JEFFERY NOW NASH MOTORS CO.

KENOSHA, WIS., Sept. 2—Coincident with the complete taking over of the Thomas B. Jeffery Co. by C. W. Nash and his associates, the new name of the maker of Jeffery trucks and passenger cars is the Nash Motors Co. Nash, the head of the new concern, will give his personal attention to the working out of plans for an increased production of both trucks and cars.

The directorate of the new Nash company consists of the following: J. J. Storrow, Lee, Higginson & Co., chairman; Charles W. Nash, Frederick W. Allen, Robert S. Herrick and S. F. Pryor.

BUICK DROPS TRUCKS

FLINT, MICH., Sept. 8—The Buick Motor Co., of this city, has discontinued the manufacture of its 1500-lb. delivery vehicle.

A NEW DENMO 1000-POUNDER?

CLEVELAND, OHIO, Sept. 2—It is expected that the Denneen Motor Co., of this city, will soon bring out a new 1000-pound vehicle to sell complete at between $750 and $800, in addition to its 1¼-ton model as described in the Sept. 1, 1916, issued of the COMMERCIAL VEHICLE. It is understood that standard truck units will be used in the construction of the smaller vehicle and that it will be sold fully equipped, including a standard body.

1- AND 2-TON FORSCHLER TRACTORS

NEW ORLEANS, LA., Sept. 5—Two four-wheel tractors, one of 1-ton and the other of 2-ton capacity will be manufactured by the Forschler Motor Truck Mfg. Co., of this city. Both will employ the double-frame construction characteristic of former Forschler products in which the motor, driving mechanism and driver's seat are carried on a separate frame supported on light springs while the load, whether in an ordinary body or at the front end a two-wheeled trailer, is carried on an outside frame supported on heavy springs.

The new vehicles will employ Continental motors and the drive will be optional between chain and worm drive. Other details are as follows:

	1-ton	2-ton
Wheelbase	120 inches	144 inches
Motor	3½ by 5	4⅛ by 5¼
Tires:		
Front	36 by 3	36 by 4
Rear	36 by 4	36 by 6

MAIS STOPS MANUFACTURE

INDIANAPOLIS, IND., Sept. 8—The manufacture of the Mais truck by the Mais Motor Truck Co. has been discontinued. The Mais plant has been purchased by the Premier Motor Corp., and is now being used for other purposes. The Mais organization has not been disposed of, however, and the Premier company is carrying a full stock of repair parts for Mais trucks now in service.

VULCAN TRUCKS DISCONTINUED

SHARON, PA., Sept. 6—The line of Vulcan motor trucks, made by the Driggs-Seabury Ordnance Co., in this city, has been discontinued. The Vulcan truck, which up until 1915 was made in 2-, 3-, 5-, 6- and 7½-ton capacities, was this year offered in all except the two larger sizes. The Vulcan vehicle was one of the few foreign-designed trucks to be used to any extent in this country, being the American edition of the British Commercar. The Driggs-Seabury company is one of the oldest gun-making concerns in this country.

TRUCKS AT COLUMBUS SHOW

COLUMBUS, OHIO, Sept. 2.—Motor trucks played an important part in the fall motor vehicle show held by the Columbus Automobile Show, in conjunction with the Ohio State Fair, which ended to-day, Sept. 2. One large building was used exclusively to show the commercial vehicles and passenger cars. The makes of trucks shown were the Federal, Vim. Republic, Sterling, Buick, Packard, United States, Indiana, Service, Reo, Jeffery, I. H. C. and the Smith Form-a-truck, a Ford adapter.

MASTER PLUGS FOR POSTAL VEHICLES

HARTFORD, CONN., Sept. 7—The Hartford Machine Screw Co., this city, has just secured the contract for filling the spark plug requirements of the vehicles of the United States postal service for 1 year, the Postmaster General having specified his preference for the Master Calorite plugs made by the Hartford company.

Coming Commercial Vehicle Events

Sept. 10-16	Milwaukee, Wis., Second Annual Motor Show, Machinery Building.
Oct. 20	Cincinnati, Ohio, Good Roads Show, Music Hall.
1917	
Jan. 13-20	Montreal, Que., Can., Montreal Motor Show.
Feb.	Newark, N. J., Passenger Car and Motor Truck Show, First Regiment Armory.
Feb. 3-10	Minneapolis, Minn., Tenth Annual Auto Show.
March 3-10	Boston, Mass., Fifteenth Annual Motor Vehicle Show, Mechanics' Building.

50 Millions Stock Is Firestone Plan

Hold Meeting Sept. 30 to Pass on 46 Million Increase

AKRON, OHIO, Sept. 4—The Firestone Tire & Rubber Co. has called a meeting of shareholders for Sept. 30, to authorize an increase in capital from $4,000,000 to $50,000,000.

Of the new capital $10,000,000 will be 6 per cent preferred, of which $5,000,000 has been underwritten by banking interests. The other $5,000,000 will not be issued at present.

The present issue of $1,000,000 preferred will be retired at 110, and the present common stock issue of $3,000,000 will be increased to $40,000,000. Dividends on this new common will be at the rate of 5 per cent.

It is reported that a stock dividend of from 700 tto 800 per cent will be declared. If this dividend is 700 per cent, the income return to the shareholder will be just double the 20 per cent now paid on the smaller issue.

Six years ago Firestone common was selling for $105 a share. By 1915 it reached $360 a share. During the panic period it dropped to $300 a share, but by July of last year had reached $510. Yesterday it sold for $1,050 a share, an increase of 900 per cent in 6 years.

ITALIAN TIRE INDUSTRY PROSPEROUS

NEW YORK, N. Y., Sept. 8.—The tire industry in Italy is at present in a very prosperous condition. G. A. Pirelli, son of the owner of the Pirelli Tire Company, which employs 10,000 men in its various factories, is visiting this country to make purchases of machinery and other supplies for his father's plants in Bicocca, Italy; Barcelona, Spain, and Southampton, England. This company is the largest producer of tires in Italy, and has been in the tire business 15 years. Over 1,500 pneumatic tires and tubes are turned out daily, and truck tires to the number about 800 daily.

As there are only two other large tire concerns in Italy, namely Michelin and Tedeschi, the tire production is one of the most important branches of the motor vehicle industry there, as it supplies nearly 130,000 vehicles, and has little competition from other countries.

The Italian tire, passenger car and truck firms are busy at the present time with war orders, which constitute most of the business. Industrial conditions have been little hampered by the war, and the factories have kept busy supplying the government and domestic wants. New plants are being built to take care of this large demand.

1917 BOSTON SHOW MARCH 3-10

BOSTON, MASS., Sept. 2—The fifteenth annual Boston motor vehicle show will be held from March 3 to 10, 1917. As previously, it will be under the auspices of the Boston Automobile Dealers' Assn., Inc., with Chester I. Campbell as general manager. Motor trucks, passenger cars, motorcycles and accessories will be shown simultaneously in the Mechanics buildings, which has 105,000 sq. ft. of exhibition floor space.

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Good Roads Improvement Due to Motors

Government Study Shows Results in Eastern States

WASHINGTON, D. C., Sept. 11.—The great extension in the use of motor vehicles in the past few years has brought about a marked increase in the construction of new, substantial and more costly types of roads in New York, New Jersey and Pennsylvania, it has been found by the U. S. Department of Agriculture. The third 5-yearly study of road mileage, road types and highway financies in the three Middle Atlantic States, just reported by the Office of Public Roads and Rural Engineering, in Department Bulletin No. 386, shows that in 1914 roads treated with bituminous preparations made up 15.4 per cent of the improved highways as against 1 per cent in 1909.

A similar showing is made in the report for concrete, brick and other of the more substantial materials used in road construction. Approximately 9 per cent of the improved road mileage of the three commonwealths is now surfaced with such materials, while in 1909 roads of this type constituted only 1 per cent of the improved highways. In 1904, when the first road study was made, neither bituminous nor the more substantial roads were found in the three States, untreated macadam and gravel roads predominating.

In 1914 the three States named spent in road improvement $40,864,831, of which the detailed expenditures were: New York, more than $23,000,000; New Jersey, more than $7,000,000; Pennsylvania, more than $10,000,000. In addition, county, town and township bonds voted in New York totaled nearly $12,000,000; in New Jersey, $14,000,000; in Pennsylvania, $27,500,000. New York was the only one of the three commonwealths voting State bonds for road improvement. The amount authorized to the close of 1914 was $100,000,000, of which $65,000,000 had been issued. All the three States have highway departments and apply State funds to road improvement. Approximately one-third of all expenditures are provided by local units in New York, and about one-half in New Jersey and Pennsylvania.

Altogether the road mileage in the three Middle Atlantic States on Jan. 1, 1915, was 185,770.84 miles, of which the approximate State mileages were: New York, 79,000; New Jersey, 15,000; Pennsylvania, 91,500. This is exclusive of practically all streets in incorporated cities and towns. The percentages of surfaced roads added in the 5-year period were 3.5 in New York, 17 in New Jersey and 7 in Pennsylvania.

S. A. E. LAMP STANDARDS

NEW YORK CITY, Sept. 2—It is thought possible that the experimental work now being done by the electrical equipment division of the S. A. E. standards committee may result in a great reduction of glare in headlamps and also in the elimination of all focusing devices. A focusing device is only an adjustment to counteract the ill effects of inaccurate reflectors and lamp bulbs. Experiments made at Nela Park, Cleveland, by a committee of the division some months ago showed that certain types of bulb filament and certain types of reflector were less sensitive than others, that is to say, they found it possible with some bulbs and reflectors to alter the adjustment of the focusing device quite considerably without affecting the nature or quality of the light seriously.

Another meeting held at Cleveland last week discussed the results of the tests having full specifications of the best bulbs and reflectors before them, and ascertained that it is possible commercially so to make bulbs and reflectors that any pair will assemble correctly without individual focusing.

The essential with respect to the bulb is that the filament shall be truly central within fairly fine limits, and for the reflector the focal length must be close to 1¼ in. With a reflector accurate in form within the limits of normal manufacture and with a bulb just a little more accurate than the present average and the right shape of filament no focusing is necessary.

S. A. E. MID-WINTER CONCLAVE JAN. 9-11

NEW YORK CITY, Sept. 2—According to the plans now under discussion, Tuesday, Wednesday and Thursday, Jan. 9, 10 and 11, are the days that S. A. E. members should bear in mind. They are the days of the annual mid-winter meeting. This year the New York motor vehicle show is held a week later than formerly, so as not to interfere with the New Year's holidays as it has done for years past.

The show week begins Saturday, Jan. 6, and ends the following Saturday night, Jan. 13.

The annual S. A. E. dinner, the social feature of the week, will surely be held in Hotel Biltmore on Thursday evening, Jan. 11. The grand ball room with capacity for 750 guests has been selected because in connection with this hall are other large reception halls that have accommodation for that number.

As a climax to the dinner the Society through its 1916 Meetings Committee has secured the Midnight Frolic for that night, practically the entire seating space being reserved for S. A. E. members and guests.

CONTRACTOR BUYS FIFTY WHITES

PHILADELPHIA, PA., Sept. 7—Stedman Bent, a large trucking contractor in this city, has just purchased fifty White 5-ton trucks on one order. The vehicles will be used in contracting work here and will be mounted on Goodrich De Luxe tires.

The purchase is distinguished by the fact that such a large number of trucks were bought at one time, for although there are many concerns of national prominence which have a larger total number of trucks, these have been purchased generally during a period of several years. In addition, the trucks of such concerns, as, for instance, the Standard Oil Co., Armour & Co., are scattered over the country, but those purchased by Bent will be used in Philadelphia exclusively.

GOTHAM GASOLINE DROPS 1 CENT

NEW YORK CITY, Sept. 5—Gasoline prices in this city, Long Island, and Connecticut, have been lowered 1 cent a gallon wholesale to 22 cents by the Standard Oil Co. Texas gasoline sells at 23 cents wholesale. Quotations from the rest of the country are as yet unchanged, though prices are expected to drop.

Maine Trucks Increase 75 Per Cent

1,834 Trucks This Year—1,096 in 1915—Good Roads Aid

AUGUSTA, ME., Sept. 2.—Motor vehicles for commercial purposes have shown a very decided increase in Maine this year. From January 1 to August 1, last year, there were just 1,096 trucks registered in the State. For the same period this year there were 1,834. That is an increase of just 736 vehicles, or very nearly 75 per cent. This is due in a large measure to the great improvement in the highways of the State. When the big bond issue of $2,000,000 was voted a couple of years ago, and a highway commission formed to build trunk highways connecting the various cities and towns with passable roads, the number of trucks began to increase. Many of the roads were improved last year, and so the possibility of using commercial vehicles became a reality instead of a dream. That there is a big future for trucks in Maine is admitted. The big potato growers can use hundreds of them bringing their crops to the railroads. The big pulp, lumber and paper mills can use more. In the cities the merchants are motorizing their delivery systems more and more, until in the future Maine will stand well up in the list of truck States when the per capita wealth and population are considered.

SUCCESSFUL BRITISH BUSES

LONDON, Sept. 2.—Several British street railway companies are finding the use of motor buses profitable as feeders or auxiliaries to their rail service. For instance, the motor bus section of the Sheffield Corporation Tramways earned a gross profit of $26,850 during the business year ended March 25, 1916. The company operated 21 buses in regular service on 10 routes totaling 30 miles in length, 5 of which extend for a considerable distance beyond the city limits. More than half a million miles were traversed by the buses during the year.

The Birmingham Corporation Tramways earned a profit of more than $50,000 in the year ended March 31. Its 41 motor buses carried 6,300,00 passengers and covered 938,226 miles, earning a gross average revenue of nearly 25 cents per bus-mile, while operating expenses averaged less than 18 cents per bus-mile.

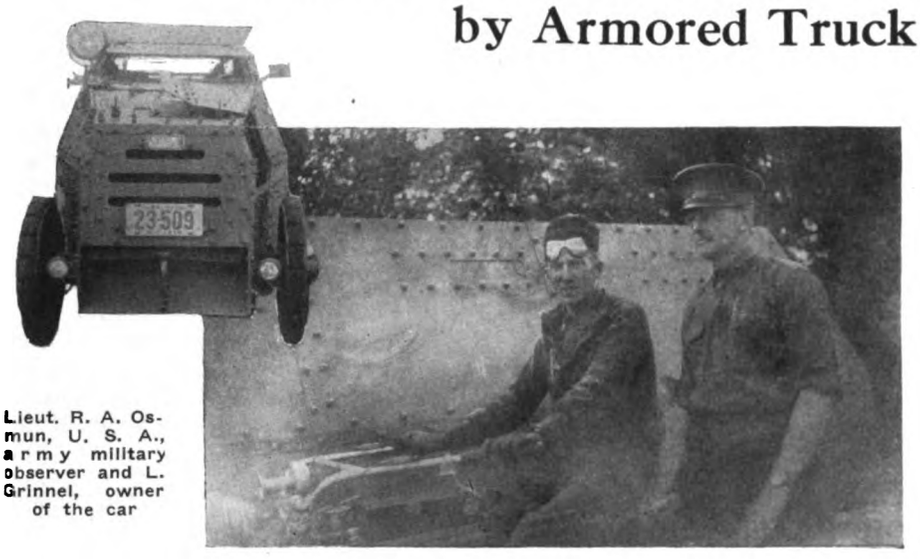
Other English systems operating motor buses are the York Corporation Tramway Department, Oldham county borough and Bournemouth Corporation Tramways.

All of these municipally-owned services are finding that the motor bus is giving them a new lease of life, for fresh revenue is brought in without spending large sums on permanent track and overhead equipment. The buses, while not always showing profits themselves, increase the traffic on the rail lines.

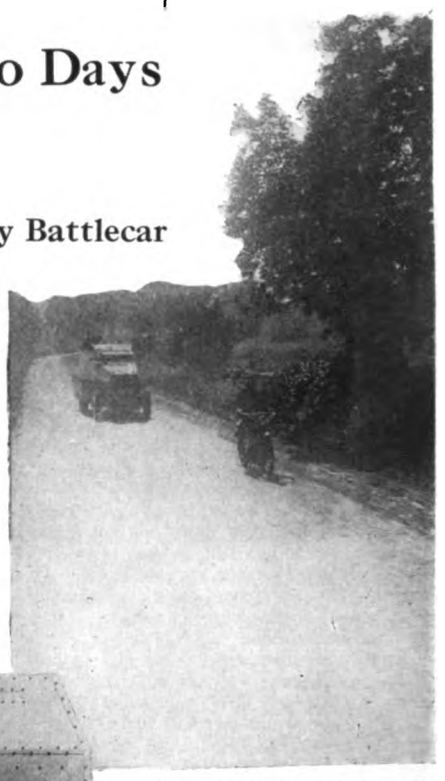
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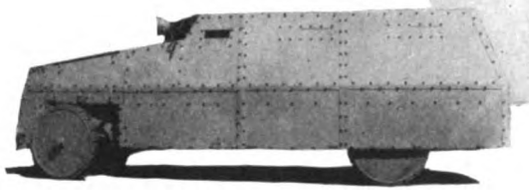
New York to Plattsburg in Two Days by Armored Truck

By Battlecar



Lieut. R. A. Osmun, U. S. A., army military observer and L. Grinnel, owner of the car





The motorcycle scouting the way on a smooth stretch of state road

A MONTH'S march in 2 days was made by a Mack armored truck when L. Grinnel, a wealthy rookie, sent his battlecar Overland from New York to Plattsburg, 325 miles, in 22 hr. 13 min. actual running time. Just a year before an armored motor train in which there was an armored Cadillac touring car made the run in 4½ days.

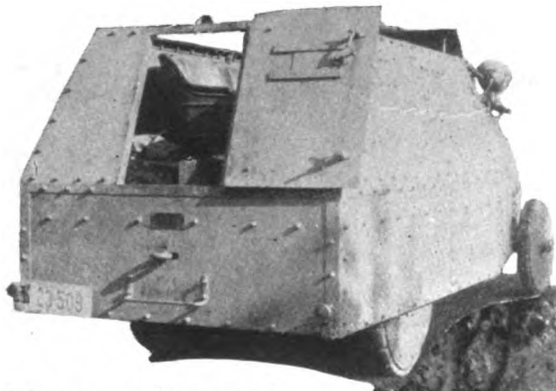
The vehicle left New York at 4.28 a. m., Wednesday, Aug. 30, and arrived at the Plattsburg training camp at 10 o'clock Thursday evening, Aug. 31, the total time elapsed between the start and finish being 41 hr. 31 min. Of this 14 hr. 49 min. was consumed by stops for meals and the night stop at Troy, which would be eliminated in actual warfare.

A cavalry troop would have taken at least 15 days to make the march, and would have had difficulty in subsisting for this length of time on carried rations.

The truck is an exact duplicate of one of three supplied to the National Guard of New York, consisting of a stock Mack 2-ton worm-driven truck chassis fitted with an armored steel body capable of withstanding United States Army rifle or machine-gun fire at 50 yd., and weighs about 9500 lb. It was purchased at a cost of about $8,000, not including any armament, by Mr. Grinnel for use by the New Bedford Rifle Assn. of Massachusetts, of which he is an organizer. At Plattsburg it was assigned to the Englewood motorcycle machine gun troop, with which it maneuvered. Mr. Grinnel is the son of the inventor of the Grinnel automatic sprinkler for buildings.

The average road speed was 10.3 miles per hour; or, subtracting 4 hr. 29 min. of minor road stops, not including the night or meal stops, an actual running speed of 14.6 miles per hour. This performance was made in spite of four detours of some length and one run of 20 miles on the roughest sort of mountain road between Elizabethtown and Keesville. At this point the speed was only 9.4 miles per hour. Between Troy and Saratoga Springs the 30.1-mile run was made in 1 hr. 40 min. at a speed of 19 miles.

There were nineteen stops other than for meals and sleep, but no serious mechanical trouble. The engine missed some and one of the Kelly sectional blocks on the right rear wheel was lost when the truck came near going off the road on a particularly bad detour be-



Rear of Grinnel's armored truck, showing temporary seats for the observer and owner



In the Adirondacks, showing one of the long, tortuous grades through the mountain defiles

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tween Rhinebeck and Hudson. The driver failed to get the low gear meshed in time on a bad hill, so the truck backed within a few inches of a deep ditch before the brakes were applied, and the wheels were blocked to enable it to get out under its own power.

Besides detours and a bad stretch above Elizabethtown, the roads on an average were excellent; but the many turns slowed the vehicle down, due to the impossibility of seeing ahead and the danger of meeting other cars on the narrow roads. Paced by a motorcycle, however, it made 31 and 32 miles per hour frequently on good straight roads. The machine was built for Grinnel by the International Motor Co. Being a rookie at Plattsburg, he determined, on being notified that the car was completed, to run it up there and put it through maneuvers with the Englewood battery on the hike of the August camp. Lieut. R. A. Osmun of the Coast Artillery corps at Governors Island escorted the car on an Indian motorcycle. In the machine were Grinnel, H. F. Welch, engineering department, International Motor Co.; M. C. Horine, editor of THE COMMERCIAL VEHICLE, observer and S. A. E. representative, and W. J. Wright, driver. The gasoline consumption was better than 7¼ miles to the gallon.

After a week at Plattsburg the truck returned to New York to be equipped with armament of rapid-fire guns and barbettes.

Reo Truck and Car Companies Combine for Greater Efficiency

Truck Shares to Be Exchanged for Those of Car Company

LANSING, MINN., Sept 8 — The Reo Motor Truck Co. and the Reo Motor Car Co. will be formally consolidated by an exchange of the shares of the truck concern for an equal number of shares of the passenger car company. The reason for the change is that increased business has correspondingly increased the difficulties of handling the affairs of the two corporations separately. Up to the present time the same executive, selling and office organizations have endeavored to handle the business of both companies separately and it is the belief of the directors that better results can be obtained by one well-organized administration.

The Reo Motor Car Co. has only recently purchased three city blocks, located south of the Grand Trunk Railroad tracks and extending to the Michigan Central yards in Lansing. By other purchases in the same territory, the Reo company now has a ½-mile strip of land along the Grand Trunk tracks. It is expected that this land will be used for the erection of additional factory structures in the near future to take care of the company's increased business.

STUDEBAKER EXPANDING

DETROIT, Sept. 9—Plant additions to cost $1,500,000 are planned by the Studebaker Corp. for its Detroit and South Bend, Ind., factories. When these important extensions have been completed, it is expected that it will be possible for the corporation to exceed a gross annual business done or cash turnover of more than $100,000,000.

Already contracts have been let for the construction of a large foundry and machine shop on part of the land now occupied as a lumber storage space at the South Bend factory. The foundry will be 1100 ft. long by 150 ft. wide, and will be equipped with four cupolas, with a melting capacity of 250 tons daily. The new machine shop will be 900 by 300 ft. and will enable the present facilities to be doubled.

Detroit contracts are now being let for the construction of a one-story building with about 25,000 sq. ft. of floor space, adjoining plant No. 3, which is located on the west side of the city. It will be devoted to final assembly work. Another floor, measuring 50 by 300 ft., is to be built on one of the three-story buildings now used as a warehouse for materials. This latter addition will enable the still greater stocking up of materials in advance of immediate needs. Other extensive additions to the Detroit plants are to be made, but details of these are not given out at this time.

LIGHT DIDN'T DAZZLE BOSTON JUDGE

BOSTON, MASS., Sept. 9—Judge John Perrins, Jr., had a case before him of a Ford demonstrator who was using Warner lens equipment, the police claiming that it dazzled them. Attorneys for the agents fought the case and succeeded in getting the judge to agree to a demonstration. With police officials he went to the parkways, and spaces were measured off according to the Massachusetts headlight law and the judge went over the matter. He decided the Warner lens was not amenable to the law. The Refracto device was also before him for a decision, and he discharged the motorist using that also, but said that while at the time he saw it it was meeting the law there was a possibility of its being out of focus and not being a proper device. He said the Warner, while brilliant, as it needed to be to show an object 150 ft. away, was not dazzling. In other words, the focusing of the bulbs had no effect upon them.

The Highway Commission has refused to approve any devices, because, while they are all right sometimes, if the bulbs are not focussed properly they are not lawful, and so the commission would not certify them until this defect could be overcome. Other judges have not made any investigations, merely taking the testimony of the policeman that he was dazzled by the glare of the lamps and finding the motorist guilty.

Truck Exports in 1916 Fiscal Year 27 Times Those of 1914

But July, 1916, Figures Show Exports Are Now Decreasing

WASHINGTON, D. C., Aug. 17—Twenty-seven times the number of commercial vehicles were exported in the fiscal year of 1916 as were shipped abroad in that of 2 years ago. The value of these exports was forty-eight times greater. The motor truck industry has exported more trucks in the 12 months from June, 1915, to June, 1916, than its total production a few years ago. In 1 year truck exports have increased nearly two-thirds in number and slightly more than two-thirds in value.

The export figures for 3 years follow:

Fiscal Year	Commercial Vehicles	
Ending June 30	Number	Value
1914	784	$1,181,611
1915	13,996	39,140,682
1916	21,265	56,805,548

The export figures for the month of July, 1916, show that 1243 trucks, valued at $3,062,670, were shipped abroad. These figures are almost 50 per cent less than those of the corresponding month of 1915, when 2469 trucks, valued at $6,803,001 were exported.

The exports for the 7-month period of 1916 were slightly less than those of the same period of the year previous. In that period of 1915, 13,428 trucks, valued at $37,499,768, were exported, as compared with 11,373 vehicles, valued at $30,725,682, this year.

TRUCK CLUB OUTING SUCCESSFUL

NEW YORK CITY, Sept. 13—The fifth annual outing of the Motor Truck Club of America was held to-day at Karatsonyi's Hotel, Glenwood Landing, L. I. It proved to be one of the most successful outings ever held by the club and was attended by close to 100 truck owners and representatives of the trade and their friends. The trip from New York City to the landing point in Long Island was made on a chartered steamer—a delightful 3-hr. sail up the Sound.

After the boat had docked at Glenwood Landing, a baseball game between picked teams of the owner and trade members was staged, followed by a 50-yd. dash for the men and a baseball throwing contest for the ladies. After supper dancing was indulged in until the boat left on its return trip.

The owners' baseball team, captained by A. G. Taylor, truck superintendent of the E. W. Bliss Co., Brooklyn, N. Y., worsted the trade team led by Joseph Husson, Associate Editor of this magazine. Prizes were awarded for the races and the dancing and two others were drawn for in an old-fashioned grab-bag contest. The chairman of the outing committee was W. S. Mears, who was ably assisted by F. Nelson Carle and C. M. Geiger.

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Opportunity Beckons the American Motor Truck in South America's Large Expanses

Part IV

Coffee Industry Offers Big Field for all Types of Trucks
Rio Market Already Oversold

By David Beecroft

THE best motor truck market in the United States of Brazil is in the state of Sao Paulo. This includes the majority of the great coffee area of Brazil and the city of Sao Paulo, the Chicago of Brazil, and one of the best and most enterprising business areas in all of South America. To-day this area is a better truck market than the capital city of Rio de Janeiro, which has more than twice as many motor trucks in operation to-day as Sao Paulo city or the entire state. Rio is not an active truck market to-day. It is an over-supplied market. European makers stocked Rio 4 or 5 years ago. The city was oversold on trucks, and there are to-day not a few Rio dealers who have large stocks of trucks on hand. One Rio dealer admits having over forty large trucks on hand, the majority of which he has had in stock for several years. He has sold over 250 trucks in the city, and is naturally quite burdened in carrying his present stock, which he has not been able to move for nearly 3 years.

Why Rio Is Poor Truck Market

There are several reasons why Rio is not the great truck market of Brazil. It is the largest city in the country. It is the federal capital, and in it the business interests of the country center. Businessmen from all of the twenty states of Brazil come to Rio just as our own businessmen from many of our states come to New York or Chicago. Rio occupies the peculiar distinction of being the political capital of the United States of Brazil as well as the largest financial and business center of the nation. Notwithstanding this, the city is not a good truck market to-day, not so good as the state of Sao Paulo.

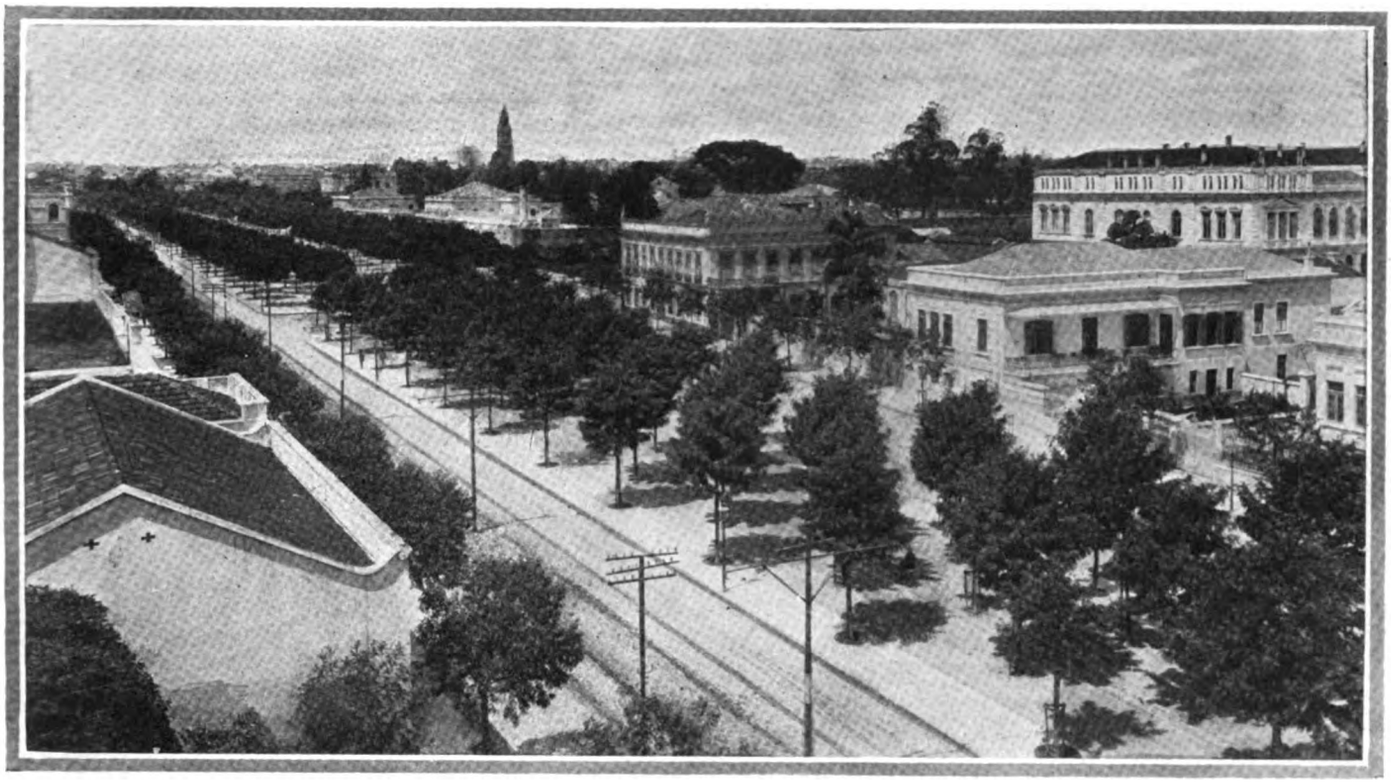
Geographical Limitations

Still another reason why the city of Rio de Janeiro is not a very large truck



This is the Union passenger depot in the heart of the city of Sao Paulo. It shows the modern spirit of the city. The wide street is ideal for motor truck and motor car traffic. In the city are many other new streets of equal width, and while there are narrower streets in the business section of the city, the use of motor trucks is not hampered by them as much as might be imagined. While the city has not more than 500,000 population, it has a go-ahead spirit which is destined to make it one of the greatest in Brazil. It is destined to be the great distributing center for the entire state of Sao Paulo, and the enormous state of Matto Grosso, one of the largest states in Brazil. Sao Paulo is also developing as a distributing center for other adjacent states

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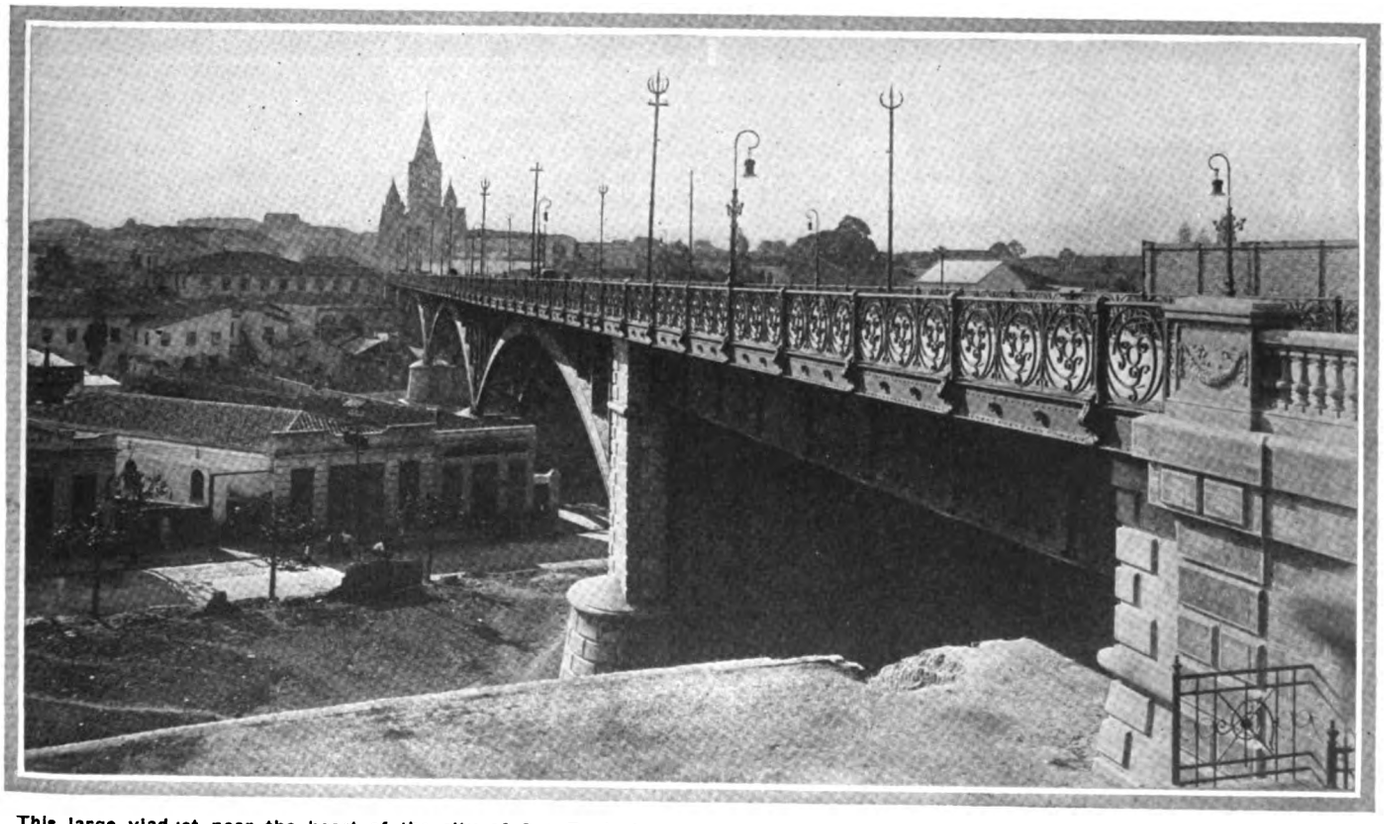


Avenida Tiradentes, Sao Paulo, not the best, but one of the important residential streets of that city which is called the Chicago of Brazil. This avenue is a triple roadway and is an ideal street for motor traffic. There are many such in the city. Avenida de Paulista is the finest residential street of the city and motor trucks are not barred on the street. The city of Sao Paulo is located practically on the edge of the coffee country and all of the coffee shipped passes through the city by train

market is that the city is located in a small area surrounded by mountains, so that truck activity is practically confined to the city and a few suburbs, with a population totaling perhaps 1,000,000. You cannot drive a motor car from Rio to Petropolis, the summer capital, which is but little over 50 miles distant. The trip has not yet been made by motor car. When such a trip cannot be made by motor car there is little possibility of making it by truck.

Lack of Roads Hinders Development

Recently George Gaidzik, South American representative of the Jeffery com-



This large viaduct near the heart of the city of Sao Paulo is an example of the enterprising spirit of the city and is indicative of the general go-ahead spirit of the state of Sao Paulo. This viaduct carries double street car lines and is amply wide for all kinds of traffic in both directions. When you find a city adding street improvements of this nature you are certain it will be a profitable motor truck market

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This is one of the busy business streets of Sao Paulo and is an example of the Spanish type of city. The street is so narrow that one way traffic is a regulation. This makes it possible to make good speed with a motor truck or motor car. There are many streets in the heart of the city of equal width, but fortunately there are many much wider, so that the use of motor trucks is as favorable as in Boston

pany, endeavored to make the trip from Rio to Petropolis in a Jeffery Quad, and after several days' effort was only able to cover 35 miles and had to return to Rio. It was simply a case of no bridges and no roads. You cannot climb mountain peaks with any kind of truck, and if you have no bridges you cannot cross certain streams. Rio is thus a city very much isolated and nestled around a bay that is nearly 100 miles in circumference with a fringe of mountains around the bay at every point, excepting where it enters the ocean. There is thus no large field for truck use there, and the sale of trucks in Rio will be for local use.

There is, however, one respect in which Rio is a most important truck center for the entire United States of Brazil. Being the federal capital, Rio has used the government for its own benefit and naturally to the disadvantage of other cities and the twenty states. In Brazil there is no free interchange of freight and merchandise among the twenty Brazilian states. If you ship from one state into another you must pay an export tax. To draw a parallel in U. S. A., suppose you are a manufacturer in Michigan and have to ship motor trucks into New York or Illinois. You would have to pay the state government of Michigan an export tax. This export tax is used by all of the states comprising the United States of Brazil as a source of revenue.

Why Rio is Distributing Center

On the other hand, the federal government of Brazil centered in Rio gets all of its revenue, or a majority of it, from the import tax on all merchandise entering the country, whether the merchandise enters through the port of Rio or through any of the other dozen ports of Brazil. It is a case of the federal government living on imports and the state governments living on export taxes.

This situation gives Rio a position of peculiar importance in that there is no export tax on any goods shipped from the port of Rio into any of the twenty states of the country. This makes Rio the natural place to locate headquarters for your Brazilian business, particularly if you purpose covering the entire country. With headquarters in Rio there is no tax for goods shipped to the state of Sao Paulo, or to such other states as



This is a general view of the coffee country in the state of Sao Paulo, Brazil. The land is rolling like Iowa or Nebraska and as far as the eye can see in many places are rows of coffee bushes. These rows are as straight as peach tree orchards in Michigan or the great vineyards in New York. The full grown coffee bush is from 10 to 14 feet in heighth and several years are required to reach this stature. The entire state of Sao Paulo is not given over to coffee, but the bush is grown generally throughout the state. Occasionally you will run into areas of several miles where you will not see a coffee bush and then go through many miles where the coffee fields are as continuous as the corn fields of central Illinois

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This is a closer view of a coffee plantation showing how numerous are the coffee pickers. At regular intervals in every coffee plantation are broad roadways such as shown for motor trucks or horse vehicles which collect the coffee as picked and transport it to the drying areas. As some of the plantations cover many tens of thousands of acres, it is often a distance of several miles from where the coffee is picked to the drying areas. At present quite a few motor trucks are used in this work and thousands more will will be used in the next 5 or 10 years

Minas, Matto Grosso, Rio Grande de Sul, etc., etc.

There is still another way in which the city of Rio de Janeiro has fortified itself as the business center of the country by the use of government influence. From Rio radiate the nationally-controlled railroad lines which are the big distributing channels to much of the country. Further, the government steamboat lines which operate along the entire coast are worked to the advantage of Rio and the natural disadvantage of other ambitious Brazilian centers. Rio has built some solid foundation stones to guarantee her future as a business center for the entire country, as well as being permanently fortified as the political capital of the nation.

Sao Paulo Best Market

Now let us return to the state of Sao Paulo, the best motor truck market in Brazil to-day, in spite of the many advantages of Rio, and in spite of the fact that Rio must eventually be the Brazilian headquarters for concerns which hope to sell trucks in all of the twenty states of a country that in area is as large as the U. S. A., Canada, Australia or all of Europe.

The state of Sao Paulo is larger in area than the six New England states of the U. S. A. In fact, you can add New Jersey to New England before you will equal the total area of Sao Paulo.

The business of the state centers in the city of Sao Paulo, which is located a few hours inland by train from the port of Santos. Santos is a night's ride by steamer from Rio. Santos only exists as the seaport for the city and state of Sao Paulo. Santos is known as the coffee port; in fact, the city is the real coffee center, and while Sao Paulo is often considered the coffee city, the honor is not here, as the coffee industry centers in Santos—that is, the headquarters of it. All of the great coffee brokers have their headquarters in Santos, and only maintain branch houses in Sao Paulo, and often not that.

Sao Paulo Distributing Center

Notwithstanding this the importance of Sao Paulo is not diminished in relation to the state of Sao Paulo. The city of Sao Paulo distributes merchandise, machinery and every other commodity to the entire state, and also to many adjoining states. The city supplies every bit of machinery for the coffee country, and if it is not the coffee center so far as buying and selling the commodity is concerned it is the supply center for everything needed in connection with the industry. The motor trucks at present used in the coffee industry were sold by Sao Paulo dealers, and those that are to go into the coffee industry will be sold through the Sao Paulo men, and not through Rio.

Santos is in no sense of the term a motor truck city. There are scarcely any motor truck or motor car dealers there. Nobody would even think of opening a truck agency there. The motor truck and motor car selling in Santos is handled by the Sao Paulo dealers. In Santos there are upward of 100 motor trucks, the majority used in the transport of coffee sacks from the Sao Paulo railway depot to the various warehouses that clean and store the coffee until it is ready to be loaded on boats for shipment to U. S. A. and other parts of the world. As previously stated, there is one concern now using over fifty German Mercedes trucks in this work, but over 90 per cent of these trucks have not been used since before the start of the war, due to the company also having many hundreds of horse wagons which are caring for the business. It is cheaper to keep motor trucks stored than to keep horses and feed them without getting any work out of them.

Short Hauls in Santos

The work of these trucks in Santos is entirely that of transporting the coffee from the depot to the warehouses. The distance varies, but averages from 1 mile to 1½ mile. Once in the warehouse there is no more use for the truck because the coffee is loaded by endless conveyers direct from the warehouse to the ocean-going steamers. All coffee is handled in sacks weighing 60 kilograms, or 132 pounds. The average crop of coffee from Sao Paulo is about 15,000,000 sacks. This totals 1,980,000,000 lb. or 990,000 tons. The cost of hauling this from de-

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pot to warehouse averages close to 3 or 4 cents per sack. The pavements over which the work is done are not the best. They are generally worn-out Belgian blocks.

There is no chance of selling trucks in Santos for the coffee trade, but there is a limited market for all kinds of light delivery vehicles in the city.

There has been much talk as to whether motor trucks cannot be used for carrying much of this coffee direct from the coffee plantations to the port of Santos and thus eliminate the railway trip. From Sao Paulo to Santos is 43 miles, but the coffee is loaded on the railway cars much further inland than Sao Paulo. The heart of the coffee country is the City of Ribeirao Preto, which is 10 hours by railway from Sao Paulo. Taking this as an average, the coffee is carried on railways perhaps on 10-hr. trips, or 241 miles. The coffee once loaded in the plantation district is not unloaded in Sao Paulo, but goes direct to Santos, so that there is no possibility of a motor truck route for coffee between Sao Paulo and Santos. If trucks are to be used for such work they would have to travel direct from the plantation to Santos.

Such truck service from plantation to Santos is impossible to-day because of poor roads, and it will undoubtedly be years before such long-distance haulage will take place. But this does not mean that there is no market in the coffee country for motor trucks. There is a great developing market for trucks. Already several of the large plantations are using European trucks, of 2-, 3- and 5-ton capacity. A few U. S. A. trucks are being used, one plantation operating Avery machines.

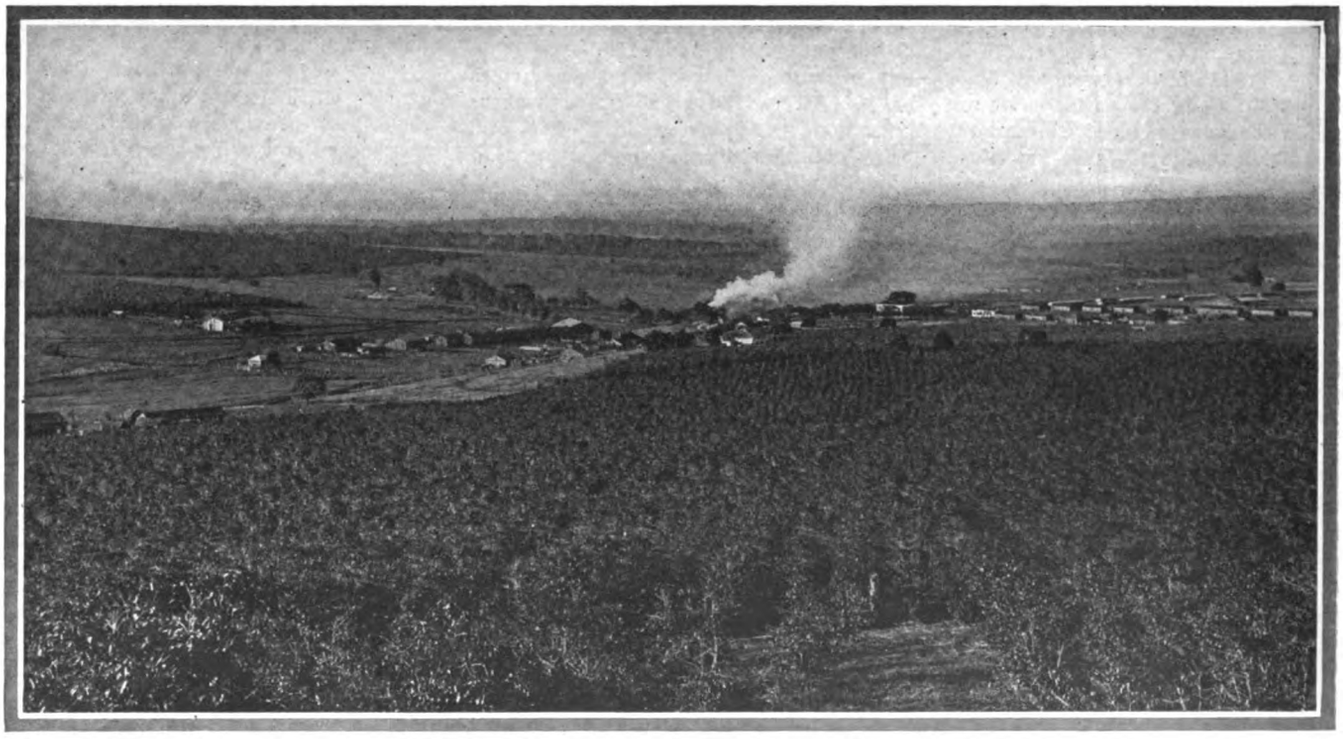
Coffee Growing Big Business

These coffee plantations are large concerns. It takes several hundred thousand dollars to go into coffee raising in Brazil. The coffee is not grown by small farmers such as cultivate the Mississippi valley, but by large corporations. These large corporations are naturally favorably disposed toward the use of machinery. The coffee plantation is also of such area that several trucks are needed on each plantation to do varied kinds of work. The coffee must be drawn often for miles from one part of the plantation to the large areas where drying and storing are carried on. There there is a trip of often 5 to 7 miles to the railway station. You can safely reckon that a very large percentage of the entire 990,000 tons of coffee each year has to be hauled on an average of several miles from the plantation to the railway depot. This is one of the great fields for motor trucks' use, but in addition do not forget the work on the plantation.

The work on the plantations is carried along for the entire year. In much of Brazil farming is an all-year-round program as compared with a one-crop program in U. S. A. Many parts of Brazil afford three crops per year, so that trucks have a field of longer use than in colder climates.

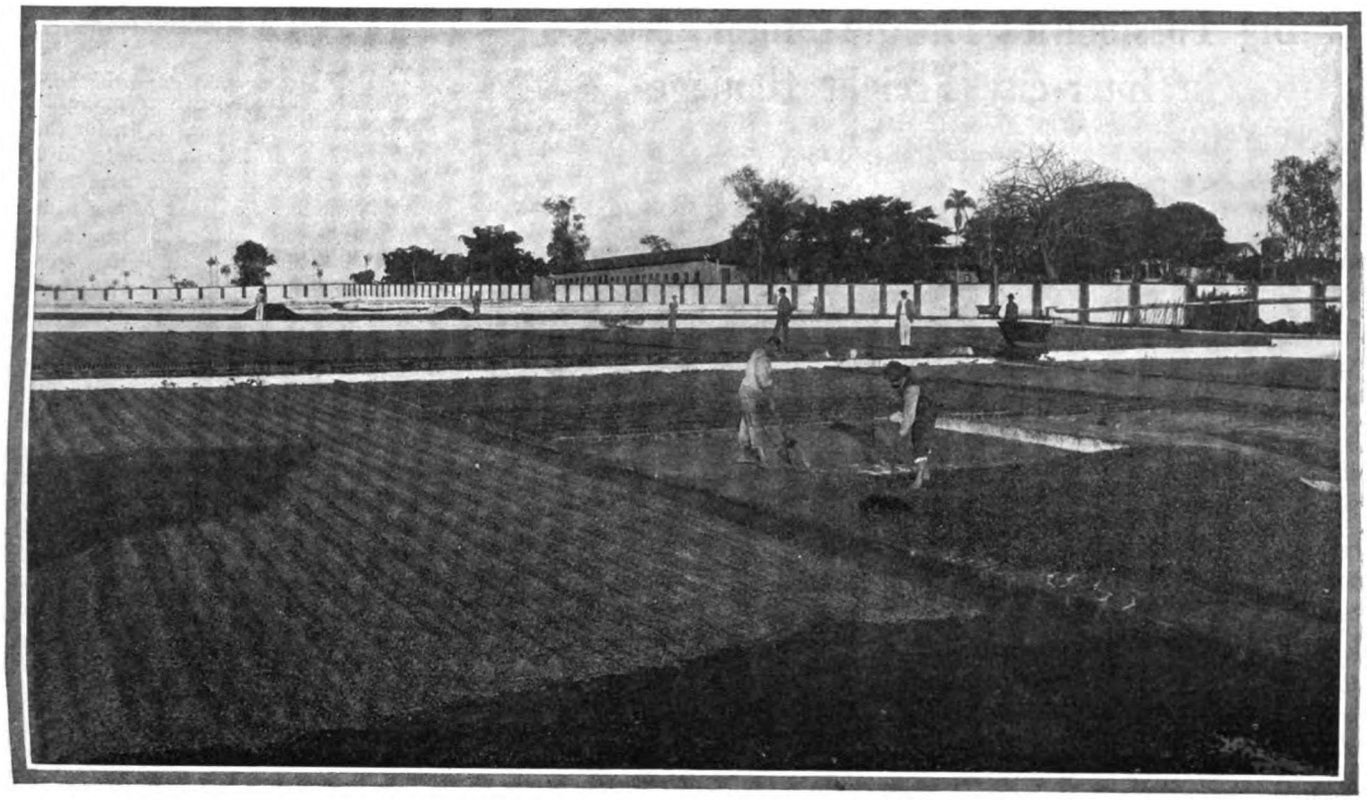
It also follows that in hot climates the life of the horse is comparatively short, and it is a further fact in Brazil that horses are generally small and not of good caliber. In spite of this, horse labor is comparatively cheap. This cheap horse labor is an argument heard on every hand against the use of motor trucks in the coffee field, but it will disappear just the same as scores of similar arguments against the use of trucks have disappeared in U. S. A. The present war has been the greatest motor truck demonstration that the world has ever known. It is already having its influence in Brazil. Brazil and Argentina have for years looked with envious eyes on the growth of each other. They are the two great rising empires in South America. True, they are separated by the two small countries of Paraguay and Uruguay that are in reality only buffer states, the same as Belgium between France and Germany. It is certain the governments of these two countries are going to favorably consider the motor truck situation. The use of motor trucks for defence will be as essential as battleships. At present the two countries are watching each other so closely that if one places an order for a battleship the other follows suit. This situation is bound to assist the sale of motor trucks. This will be particularly in the State of Sao Paulo, one of the wealthiest of the country and one that could only be protected by motor truck equipment.

Part V will deal in more particular with the needs of the coffee plantations as well as the City of Sao Paulo as a truck market.



This is a general view of the rolling country forming the state of Sao Paulo, which is the finest agricultural state of Brazil and the one in which there is the greatest demand for U. S. A. motor trucks and motor cars. This state is considerably larger than all of our six New England states combined. The soil in the coffee lands is very red and is said to be the best soil for coffee culture in the world. Through this country there are very few good roads, but the soil is such that roads can be graded easily, and as work is generally done in dry weather, there are few obstacles to the more general use of motor trucks

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A coffee plantation in the state of Sao Paulo, Brazil. This shows a typical large drying area on one of the large plantations where the coffee is handled previous to its shipment by railway to the port of Santos, from whence it is transhipped to all parts of the world. There is a large field for motor trucks in the transportation of the coffee from the plantation fields to these drying areas and also from these drying areas to the railroad

History of the Hyatt Bearing

Experiments to perfect a bearing that would withstand the heavy strains of a sugar cane mill led to the discovery of the principle and to the development of the Hyatt roller bearing.

John Wesley Hyatt, the inventor, disclosed that interesting fact recently at one of the several little celebrations in honor of his seventy-eighth birthday anniversary.

It was in 1880 that Mr. Hyatt was working with his sugar cane mill. He had perfected a mill superior to any then used, both in its efficiency for increasing the percentage of pure extraction from the cane and in greatly diminishing the time necessary for the operation. The greatest trouble he experienced with the mechanism was with the bearings. The ones he was using were obtained in the open market, but they did not prove satisfactory.

Experiments with Wood

Mr. Hyatt saw that, without an efficient anti-friction bearing, he must give up his mill project. He therefore gave his attention to this new problem—the perfection of an anti-friction bearing. The first experiments were with wood rollers. Then he worked with solid steel rollers, with vulcanized pipe and with tubing—using many different types of cages, retainers and retaining bars.

After several years of research and experiment the Hyatt flexible roller was developed and a company organized for its manufacture. The bearing first was made in a small building in Newark, N. J. Soon new buildings were necessary, and there has been a continual increase of manufacturing facilities since that time. Recently three new buildings—which increase the plant's floor space by a third—were erected at Newark, and two others in Detroit. In addition, the Hyatt company has service branches in eight different cities in the United States.

While Mr. Hyatt's name is known nationally by millions in connection with the anti-friction bearing, he has been granted patents on inventions along many diversified lines, the total being over 500. He was awarded the Perkin medal some time ago and his name was placed beside that of Sir William Henry Perkin and the six great American chemists who previously had received that honor.

The founder of the Hyatt company was born in Starkey, N. Y., in 1837. He worked first as a journeyman printer and in 1861 took out his first patent papers, covering a family knife sharpener, which included a new method for making solid emery grinding wheels.

Later, he went to Albany, where he worked as a journeyman printer. Seeing an offer of $10,000 for a substitute for ivory for billiard balls, Mr. Hyatt began experimenting in the hope of gaining the reward. He made a number of useful plastic compositions, none of which, however, was good enough for billiard balls. These experiments led him into the manufacture of checkers and dominoes made of pressed wood, and, with his two brothers, he established what is now known as the Embossing Co. of Albany.

Father of Celluloid

Many experiments followed along diversified lines and many patents were taken, among them one which covered the fundamental invention of celluloid. In establishing the Celluloid Co. of Newark, Mr. Hyatt had associated with his his brother, Isaiah S. Hyatt, and in the next few years seventy-five different patents were taken out either by the inventor of the Hyatt roller bearing or jointly with his brother.

Later, Mr. Hyatt took up the subject of water filtration and organized the Hyatt Pure Water Co. He was granted a valuable patent on an important feature of the filtration process, which marked a new era in water filtration. It was about this time that he began experimenting with the sugar cane mill and later perfected the roller bearing.

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Big Possibilities for the Motor Truck in Inter-city Freight Haulage

(*Continued from page 7*)

After the study of the conditions under which the trucks must work has been completed and before the final truck rate per ton or hundredweight is determined, it must be borne in mind that if a return load cannot be obtained on each route the cost of the truck operation on the empty return run must be added to the cost of actually handling the goods. Thus it is seen that if return loads can be obtained the rate per unit of weight hauled can be cut in half, approximately. This condition is the star to which a truck concern competing with the railroads should hitch its wagon, for under these conditions it has the greatest possible chance of success. Before such a concern quotes haulage prices upon this two-way-load basis it should seek to sign up contracts simultaneously with the concerns in the two cities between which it intends to run its trucks. These contracts should specify the minimum tonnage to be shipped each day from the various concerns in each of the cities. This procedure will insure the truck company earning its reasonable profit and will eliminate losses caused by the necessity of running the truck or trucks empty one-half of the route.

Produce Haulage Profitable

The transportation of garden products, etc., from the suburban areas into the cities is one in which trucks have perhaps a greater opportunity than in the handling of manufactured commodities, because in the former the goods are perishable and the time element therefore of the greatest importance. The runs of such trucks can be gauged to suit the requirements of the shippers instead of the railroads and the goods can thus be delivered directly to the markets at the time at which it should bring the best price. If work of this character can be secured on a contract basis with loads in both directions, it offers a very profitable field for the employment of a vast number of commercial vehicles.

The question of express work between cities does not offer the same opportunity for a lucrative business unless the cities have no adequate rail service, or unless the goods handled is highly perishable. The reason for this is that considerable time is taken up in picking up the packages and in delivering them at a large number of widely scattered points. This problem can be simplified somewhat if depots are established in both cities and the trucks simply used to carry the matter between one and the other, reserving for horse vehicles or smaller trucks the work of picking up and distributing parcels from the depots at both ends.

One of the first questions to be decided in any kind of motor truck inter-city haulage is the greatest practicable distance between the ends of the route. This can not be determined off-hand and can be settled only after a thorough study of the entire conditions surrounding the truck operation as previously outlined. Perhaps a few descriptions of installations of trucks actually engaged in the inter-city haulage of freight or produce at the present time will suffice to bring out clearly how others are employing trucks profitably in the service.

Delivery of Factory Products in Gotham

For instance, the Heavy Haulage Co., New York City, has contracted with a large manufacturing company in Westchester County to deliver all of its products in New York City, a distance of approximately 15 miles from the concern's plant. The charge for this work is the same as the combined rail rate and that of horse teamsters to deliver the goods from the Gotham freight yards to its final destination. Teaming was not necessary at the plant when the goods were shipped by rail because of convenient sidings. The truck rate on this job was not set at the combined rail-plus-horse rate at random, but was determined by a thorough study of the conditions which would be imposed upon the motor trucks and their cost of operation under such conditions. A reasonable profit was added, which brought the final rate to the combined rates under the former rail-and-horse method. This job was not obtained by underbidding but by offering a better and quicker service—the important time element again. With the old method it took 24 hours for goods to be delivered to the customers. By trucks it takes 3 hours at the most. Some difference—a mere 21 hours.

Quick Truck Service Gets Business

Industrial plants are fast realizing the importance of quick service in transportation and the part which motor trucks can render. There seems to be a tendency among many industrial firms to stop haggling about a few cents' difference between motor truck and rail-plus-horse costs provided the truck renders the quicker service. They want the motor truck man to earn a reasonable profit because they know that if he does not, he won't be satisfied, and accordingly will not render the efficient service which they seek.

The Heavy Haulage Company also has a similar contract with a manufacturing concern in Newark, N. J., for the delivery of its first-class freight in New York City. Likewise, the rate for this work is the same as that of the railroad plus the horse haulage at the destination end. This rate insures a reasonable profit. In both of these cases, loads are usually carried in one direction only, and it is the opinion of that company that a 15-mile route is the maximum paying haul for its trucks of 5 to 5½ tons capacity, handling first-class freight at all times. For hauls of 25 miles or more, it has found that its trucks can compete successfully with the railroads only when loads are guaranteed in both directions, and then only when the time element is considered.

An example of a profitable 140-mile haul, made by a convoy of several of the Heavy Haulage company's trucks in competition with the railroads, will be cited, not because it can be considered average inter-city haulage of freight, but because of some of the interesting light it throws upon the use of trailers in interurban haulage work. Due to the embargo on freight cars on the New York, New Haven & Hartford Railroad in New York City because of the great freight congestion caused by an insufficiency of shipping bottoms, the S. K. F. Ball Bearing Co., Hartford, Conn., was unable to secure freight cars for a shipment of 40 tons of material to open its new plant in that city. The factory could not be opened without this material and no freight cars were available for getting it there. Accordingly, the company contracted with the Heavy Haulage concern to haul the material to the plant for the sum of $900, or about $22.50 a ton! By rail the cost would have been approximately $100. Yet the former considered the additional $800 well spent when it considered what its loss would have been on the overhead on plant and sales, the loss due to non-production and loss of prestige due to its inability to furnish material to the trade when necessary. All of these losses surely would have occurred if the material had not been delivered on time. The trucks of the Heavy Haulage Company left New York City one night at 5.30 p. m. and arrived at Hartford at 11 p. m. on the night following. The plant was opened on time. The haulage company made a reasonable profit.

Of course this cannot be considered as average interurban freight haulage due to the unusual conditions caused by the car embargo as a result of the war. It simply again illustrates very strongly the great superiority of the motor truck for freight haulage when the time element is paramount.

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Perhaps the most interesting feature of this job was the fact that the load of 40 tons was divided up among five 5-ton trucks and three 5-ton four-wheeled trailers. Three of the trucks each pulled a trailer and the remaining two trucks acted as towing vehicles. Some of the grades encountered were estimated at 10 per cent. On these the entire convoy was held up because it was sometimes necessary to hitch three trucks together to pull one trailer up the gradient, all three of the trucks pulling at the same time.

This experience led the head of the company to offer the opinion that it is inadvisable to use trailers on inter-city haulage when the grades are in excess of 2½ per cent, for the reason that the time lost due to the reduction in the speed of the trucks attributable to the trailers, more than offsets the cost of using additional trucks to carry the trailer loads.

Louisville Truck Competes Successfully

Another instance may be cited of the Highlands Motor Transfer Co., Louisville, Ky., which carries on a large proportion of its work in competition with the railroad between that city and Shelbyville, Ky., about 30 miles distant. That concern found that it could compete successfully with the railroad in the handling of contractors' building material because of the elimination of the cost of drayage at each end of the route as well as loading and unloading charges at each end of the rail route. In addition, the material was delivered on the job about a day sooner than was possible by the rail-plus-horse method. The trucks employed are 5-tonners manned by driver and helper.

Indiana Concern Adds Thirteen Trucks

The Transportation Service Co., Richmond, Ind., which purchased its first truck, a 2-ton Reo, 2 years ago and put it into service in competition with two railroads and one interurban line, hauling freight between Richmond and New Paris, Ohio, has just purchased thirteen more trucks of the same make and capacity. These will be employed on several new routes operating between New Paris, Ohio; Eaton, Ohio; College Corner, Ind.; Oxford, Ind.; Liberty, Ind.; Cambridge, Ind.; Linn, Ind.; Hollinsburg, Ohio; Hagerstown, Ind.; Carlos City, Ind.; Union City, Ind., and Greenville, Ohio. All of these towns are comparatively small, New Paris, to which the first route was laid out, having a population of only 800.

All of the new trucks, like the first, will be operated on a regular time schedule between the various towns. Due to the elimination of the hauls from the points of shipment to the railroad yard at each end of the Richmond, Ind., and New Paris, Ohio, route, which is 20 miles each way, the trucks were able to save considerable time as compared with the railroads and interurban line.

The truck rates are also lower than those of the rail lines, and this, together with the fact that the transportation company has maintained a reliable schedule, has enabled the concern to secure a large proportion of the freight haulage.

Successful Hartford-Springfield Line

Still another instance is that of the Hartford Dispatch, which in 1913 began the operation of two 5-ton motor trucks between Hartford, Conn., and Springfield, Mass., a distance of about 26 miles. The vehicles are operated six days a week, each leaving Hartford at 8.15 p. m. and returning at 4 a. m. on the following morning, after having picked up a return load at the Springfield end.

The great bulk of the goods carried is express matter which is transferred from Hartford to Springfield. The American Express company does not enter Hartford direct, and, as there are many factories which ship to the North and West, the trucks are used mainly to transport the express matter to the American company's depot at Springfield. A small amount of goods from Springfield stores which cater to the Hartford trade is carried on the return trips. Other business includes nightly shipments of bread from Springfield to Hartford. Seventy to eighty boxes of bread, weighing approximately 3,000 pounds, reach Hartford every morning by the trucks, to be later distributed to various lunchrooms and stores. Other goods which the Hartford Dispatch carries include shipments of motor vehicle tires from a large rubber manufacturer in Springfield.

Both trucks run at night, because the factories and stores usually discharge their goods to the common carriers late in the afternoon. The trip between cities takes about 2 hours each way. The route is through East Hartford, South Windsor, East Windsor Hill, Warehouse Point, Thompsonville and Enfield to Springfield.

Los Angeles Concern Successful

There are several motor trucking concerns operating in competition with the railroads in Los Angeles, Cal. Among these is the Motor Truck & Terminal Co., which maintains a large terminal in the center of the wholesale district where shops and warehouses, together with railroad sidings, make for speed, economy and efficiency in handling freight. The concern operates close to fifty trucks, most of 5-ton capacity. Each truck is used in conjunction with detachable bodies for the saving of loading and unloading time. A 10-ton traveling crane forms a part of the terminal equipment. This picks up the detachable bodies, removing the loaded bodies with incoming freight and replacing them with those filled with out-going material.

Los Angeles is well adapted for motor truck freight haulage because it is surrounded by a thrifty agricultural district, with twenty or thirty prosperous towns within easy reach by first-class roads. For this reason most of the trucks carry loads in both directions. They haul loads of merchandise to the suburban areas and bring back loads of produce.

Due to the large fleet of trucks employed, the concern is also able to expedite freighting by rail because of its ability to assemble carload lots in short order, a thing impossible for a small trucking business.

Truck Haulage in Maryland

The Hartford Transportation Co., Baltimore, Md., operates a daily motor truck freight and express service between that city and Havre de Grace. The distance between the two cities is about 44 miles. The roads are especially good, and the truck used, a 5-ton Saurer, is able to make a trip in both directions daily.

The truck is equipped with a special low-floor body for easy loading and with side doors for expeditious unloading and loading at the various pick-up points. It has a fully-inclosed cab for the protection of the truck crew in winter.

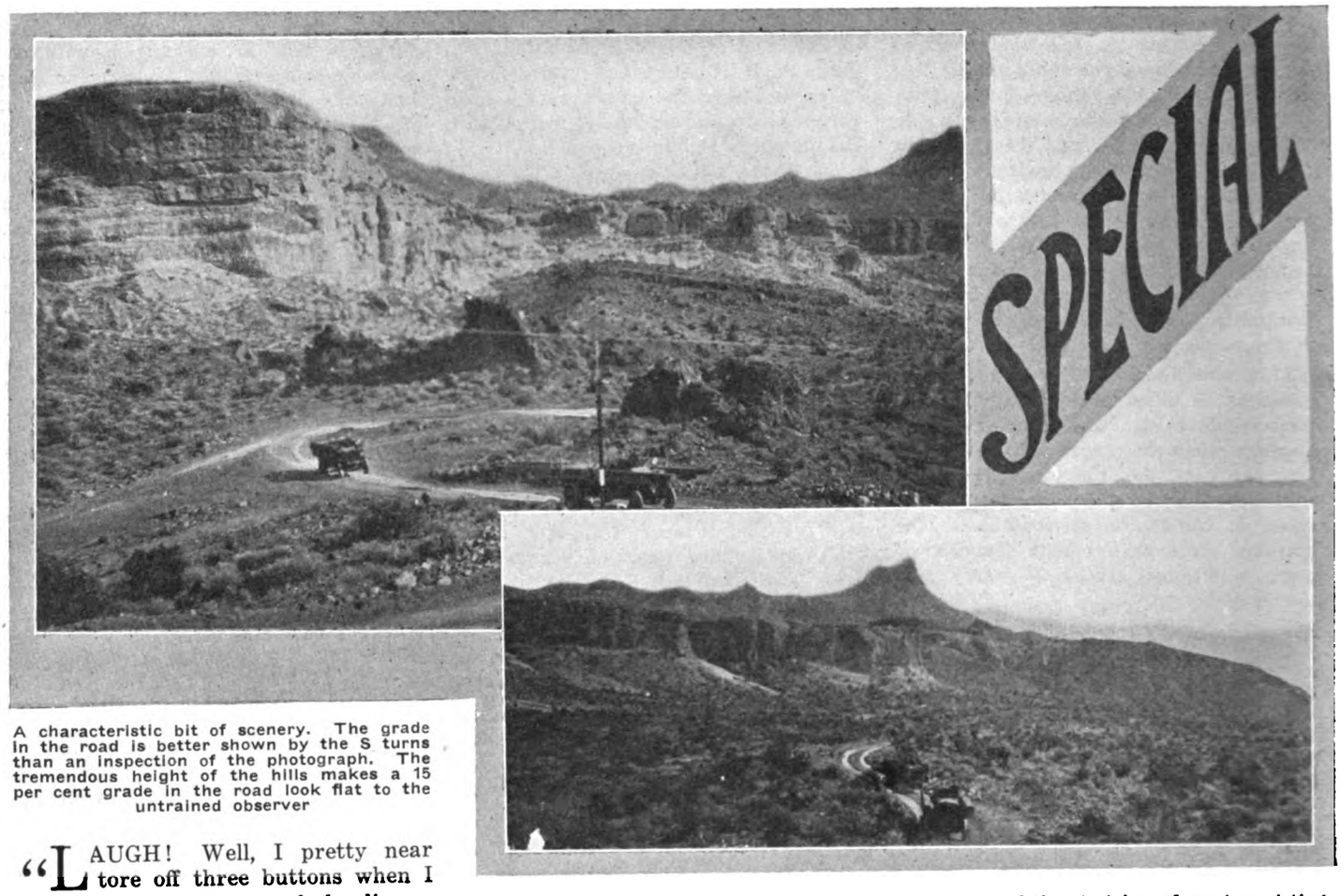
There are several important communities along the route, all of which provide considerable business. These include Overlea, Perry Hall, Kingsville, Bel Air, Fountain Green, Fulfors, Churchville, Carsins Run and Aberdeen.

Telephone Tractors Beat Railroads

The Chicago Telephone Co. has decreased the cost of handling its reels of cable by the use of a Knox tractor with a special 25-ton trailer capable of carrying three large reels at once. Before the tractor was put into service, the reels had to be shipped by rail to the track spur nearest the job and then unloaded and hauled to that point.

Many other instances of similar successful applications of motor trucks in the inter-city haulage of freight or produce could be given, but lack of space forbids in this issue. It is the intention of THE COMMERCIAL VEHICLE, however, to aid in the development of this vast and lucrative field for the use of trucks and to give in subsequent issues further and more detailed information on the subject.

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A characteristic bit of scenery. The grade in the road is better shown by the S turns than an inspection of the photograph. The tremendous height of the hills makes a 15 per cent grade in the road look flat to the untrained observer

Trekking through the greasewood and sage brush on one of the stretches of good road that make the driver's life livable. General view of the country in this section. Perhaps this does not look like a steep grade, but by the time one has pulled up 3 or 4 miles of it under load one realizes that something is heating the motor

"LAUGH! Well, I pretty near tore off three buttons when I saw a picture of a truck hauling a good-sized load of steel in some eastern city played up in the magazine as if it were some stunt for a truck to get away with. Man alive! On the street, all paved and level! Of course it would do it. But last week there was pulled off a real haul over in the desert." In these words, the correspondent of THE COMMERCIAL VEHICLE first learned of the most memorable event in the history of Oatman, Arizona, the motor-truck-built mining camp. For without trucks Oatman's pride and progress, the new First National Bank Building, would have been somewhat delayed.



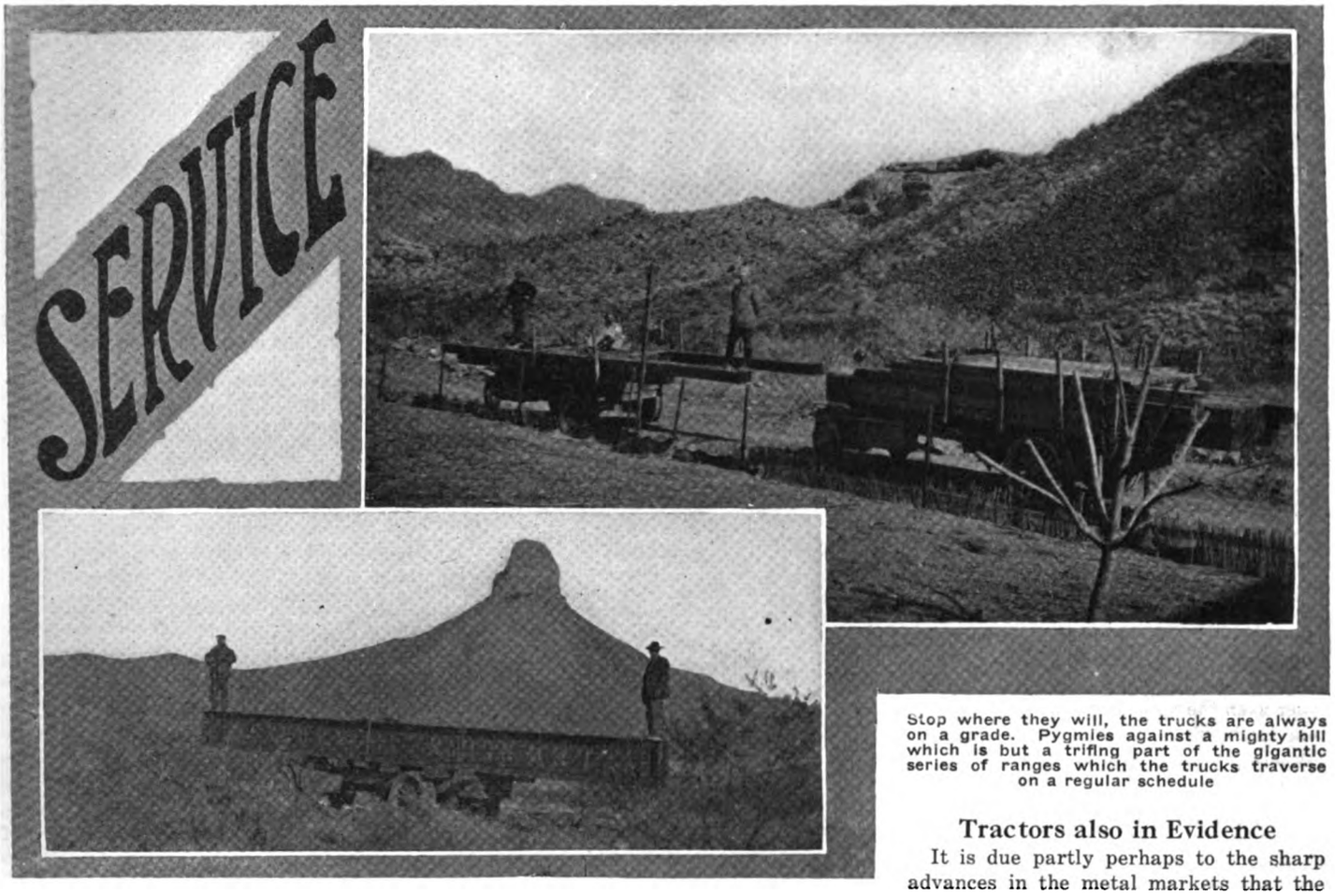
Bracing and chaining to make the two 54 ft. girders a rigid and unshifting structure firmly united to the body of the truck was a big factor in Nelson's success in transporting the unprecedented load to Oatman. Even against the background of the mighty desert hills the truck and its load make an impressive showing

Be it known Oatman is the mining camp in all the West that is crowing loudest just now, and of all mining camps in the history of the West it is the one that brags loudest of cleanliness and sound, business-like progress, and though it is a good day's travel from the railroad for a man on horseback, Oatman does not have to worry about being held back for lack of transportation. Motor trucks drag in the supplies and passenger cars give the passenger more thrills in the few minutes' run which they make across the desert than Mark Twain wrote into his famous description of Horace Greeley's first ride in a western mountain stage coach.

Those who have been to Oatman agree that it is a great place to test a motor car. Some salesmen have been there and sold trucks and do not go there any more. Their competitors bring back photographs of the vehicles sold and abandoned in sandy grades. This desert stuff takes a good truck and a handy man as a driver. There are quite a number of men who know how to pick a truck and handle it who are making good money in the hauling business at Oatman. Be it said there are all that present business will provide for there right now, and it is no ready road to wealth to show up at Oatman in a brand-new truck and try to get into the money.

However, among those who have become established, G. R. Nelson, who hauled in the big girders for the bank, has the name of doing very well. He operates two 3½-ton G. M. C. Trucks, and averages 75 tons per week per truck over the 27 miles from Kingman to Oatman; the rate for the haul being $11 to $17 per ton according to the class of merchandise and the mine to which it is delivered at Oatman.

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The 11,650 lb. load of two 54 ft. steel I-beams transported by Nelson's 3½ ton G. M. C. In the background is the famous mountain which is seen for miles around Oatman. G. R. Nelson, reputed to be the most successful hauling truck operator in Arizona, at left

The pictures show why Nelson gets so much money and why he earns it. The grades at a maximum are 21 per cent on the roads. There is plenty of competition between the individual grades to get into the maximum class. There is soft stuff and plenty of chance to slip 6 in. and fall 500 ft. and break things up a little. They load them up good and heavy but at that the wheels will spin in the sand sometimes. The country is hot and the decomposed granite and sand granules are sharp, and it is hard on tires.

When the truck gets into Oatman the driver may wipe the dust off his face and step in and have an ice-cream soda in this temperance camp in the temperance state of Arizona. But are his troubles at an end? Emphatically they are not, for he must get rid of his load before he can go home and take that well-earned sleep. This takes him to the mines, which are among the hills. There are places where trucks go with a full tank and find that gasoline will not feed into the carbureter when they once get the front wheels up the grade to some of the mines. They have to back 'em up, and a great many of them are putting on vacuum gasoline feed systems now.

The hills between Kingman and Oatman are wonderful in the lights of dawn and sunset. All red and gold and blue and purple and pink, like the Grand Canyon. But at high noon the dazzling southern desert sun wipes out all the color and if there is any weak spot in a truck the heat and labor toiling over the grade will search it out. That is why the folks who know Oatman hauling say that city men never know how good a truck is, because they never put it to the test.

Oatman's big hauling record, made by G. R. Nelson, was the taking in of the two I-beams of steel for the new First National Bank. These sticks of metal were 54 ft. long, and weighed 11,650 lb. You might have thought Nelson would have taken them one at a time. If so, you do not know these desert truck men. Nelson loaded them both onto his 3½-ton G. M. C. truck and made a trip of it, 27 miles through the desert, and when he unloaded them at the Oatman Bank the *Scripps-McRae Weekly** was there to take moving pictures. Some moneymaker, is Nelson!

*A motion-picture weekly.

Stop where they will, the trucks are always on a grade. Pygmies against a mighty hill which is but a trifling part of the gigantic series of ranges which the trucks traverse on a regular schedule

Tractors also in Evidence

It is due partly perhaps to the sharp advances in the metal markets that the mining interests have taken such an in-



When building up a road across an arroyo means all this rock work and filling, the road builders do not make it any easier for the truck than they think is absolutely necessary, and they gauge truck capacity by the best performers under ordinary loads. So when the exceptional load comes along a man's equipment must be right

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Ten-mule team used on the 18-mile haul before installation of tractor and semi-trailer. This team took 3 days to haul 10 tons a round trip of 36 miles. The tractor hauled 12¾ tons in 10 hours over the same route—a saving of over 60 per cent



Knox tractor and semi-trailer near the summit of Rocky Hill. Hydraulic brakes are holding a load consisting of 9500 lbs. of machinery, semi-trailer weighing 5800 lbs. and the weight of the tractor itself 8500 lbs.—a total of 23,800 lbs.

terest in the baffling problems of cutting down the time and cost of transportation.

Mine roads are sometimes of such a character as to make impracticable the use of the conventional motor truck, in many cases being little more than winding, rock mountain trails. The gasoline motor, however, seems destined to conquer even the miner's heavy grades, roads and loads, if we may take the experience of the Duquesne Mining & Reduction Co. as typical.

The Duquesne Mining & Reduction Co. has been using a Knox four-wheel tractor, with a semi-trailer of special design, to transport ore and concentrates from its mine at Duquesne, Ariz., to Patagonia, the nearest railroad connection, 18 miles distant. This equipment operates in the reverse direction over the same road to transport mining supplies of all kinds, including a large amount of new machinery being installed in connection with the work of developing the mine.

Some idea of this 18-mile stretch may be had from the fact that it took 3 days for a ten-mule team to make the round trip of 36 miles, hauling 3 tons of supplies on the trip to the mine and returning with a 7-ton load. To complete the comparison, it is said that the Knox tractor and semi-trailer covered the same 36-mile round trip in 10 hr., hauling 4 tons on the trip to the mine and 8½ tons on the return trip. Reduced to terms of the almighty dollar and its equivalent, the almighty hour of time, it is estimated that the improved method of gasoline transportation has effected a saving of over 48 per cent.



Jigger Hill, another long, hard pull with grades exceeding 20 per cent

The hauling has been done under the direct supervision of S. R. Montgomery, district supervisor for the Knox Motors Associates. The loads varied considerably, but experience proved that an average of 10 tons per day could easily be made. The tractor hauled as much as 5½ tons up and 10 tons down with the same apparent ease as when lighter loads were taken. Mr. Montgomery's record of tonnage hauled shows an average of 369 ton-miles over a period of 6 successive days, with a record for 1 day of 459 ton-miles.

The 18-mile haul, according to Mr. Montgomery's description, is over one of the worst roads in the State, including the famous Jigger hill and the equally well-known Rocky hill, both of which have pitches in excess of 20 per cent, with ledges of rock crossing the road diagonally, to complicate the problem of traction. Part of the way there is no road, making it necessary to follow up Creek canyon. Another interesting feature of the trip is that three different creeks have to be forded sixty-four different times.

Four different times in 10 days the mine would have been obliged to shut down had it not been for the fact that the motor equipment could make an extra night

(*Continued on page* 35)



Tractor and semi-trailer starting up a 20 per cent pitch at the foot of Rocky Hill

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Volunteer Truck Trains Do Yeoman Service at Plattsburg Training Camp

Twenty Transport Trucks, Four Water Trucks and Three Ambulances





On the camp site near Altoona a driver attempted to cross a swampy hollow and was mired up to the hubs. It was pulled out with a block and tackle by two other of the trucks



Garfords and Packards crossing typical country bridges. Note officers under bridge watching it and field gun crossing, in upper picture. The bridge survived two crossings

RESERVE CORPS officers of the future will not regard war altogether from the standpoint of 1861 if the motor truck industry can help it. On each of the 10-day hikes or field maneuvers executed by the citizen soldiers at the Plattsburg Military Training Camp this summer the services of twenty transport trucks, four tank trucks and three motor ambulances were indispensible. The pitiful array of army mule wagons would have been hopelessly inept. In the June camp there were some 7000 men who marched 10 miles a day through rough country in all weather, including killing heat and rain, and made and broke a new camp every day.

Real Campaign Life

On these hikes the student troops, commanded by a few hard-working army officers and assisted by a sprinkling of enlisted Coast Artillery troopers, were wholly self-sustaining, carrying their full field equipment with them and deriving their sustenance from the fixed base at the Plattsburg barracks. The life was practically that of actual fighting forces in war, save that the routes traversed by the troops were on a radius from the training camp so that transport trains back to the base were not needed.

Naturally the immense task of moving the camp equipment of from two regiments, in the smaller camps, to four regiments, in the midsummer camps, imposed a great burden upon the Quartermaster Corps. Three army officers headed this portion of the work. The rest were rookies and a few enlisted men who acted as drivers for the trucks and loaders.

Through the unusual courtesy of Major-Gen. Leonard Wood, Commander of the Department of the East, U. S. A., and Major Lawton, U. S. A., quartermaster of the camp, an editorial representative of THE COMMERCIAL VEHICLE was permitted to spend a week on the hike of the August camp during the first week in September. By his observations it is possible to draw some definite conclusions which indicate that however slow the army has been to recognize the importance of motor transport, it is now fully awake to it and that, whatever knowledge it may lack on the subject, experience is proving a rapid teacher.

The August camp consisted of two regiments of infantry, one of cavalry, a detachment of field artillery, a small body of engineers, two motorcycle machine-gun troops and a more or less unassigned quartermaster department. The cavalry and artillery camp was small, and was transported by four-horse mule wagons. The motorcycle troops, each equipped with a Ford, transported themselves. The infantry, however, which, according to army regulations, should have had two wagon trains of twenty-seven wagons each, or a total of fifty-four wagons and 216 mules, was served entirely by twenty motor trucks.

Makers Donate Trucks

These trucks were voluntarily supplied by the Packard Motor Car Co., Detroit, and the Garford Motor Truck Co., Lima, Ohio. The Packards, numbered 1 to 10, were exact duplicates of those supplied to the army in Mexico; the Garfords, 11 to 21, standard commercial vehicles painted the regulation olive-drab. These Garfords previous to service with the Plattsburg camp were used at the Fort Oglethorpe training camp in Georgia and after being shipped to New York

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by rail were driven to Plattsburg under their own power. Two factory representatives accompanied each of the two trains, but they were driven by coast artillerymen.

The Autocar Co., Ardmore, Pa., supplied four of its chassis, numbered 22 to 25, equipped with wooden tank bodies to keep the camp supplied with fresh drinking water. These tanks held 450 gal. each, and were filled by power-driven pumps mounted on the chassis.

One Autocar ambulance and two G. M. C. ambulances were used by the hospital corps.

A Day's Work

The work of the camp began each day with reveille at about 5 a. m. Thirty minutes after the morning call the camp was struck and breakfast about over. Another half-hour and the trucks were loaded and lined up in numerical order on the road. The marches averaged 10 miles. As soon as the train was assembled, in command of two army captains it would set out for the next camp site. The 10-mile run took an average of 1 hr. Arrived at camp, the trucks were driven in and their loads discharged in long lines which marked the heads of the company streets.

Unloading consumed another half-hour, after which most of the trucks went back for second loads. By 10 o'clock the camp was complete save for the dog-tents of the privates, which were set up by the men upon their arrival at camp.

The rookies meanwhile made the march to the new camp afoot, fighting a sham battle on the way. Upon their arrival they pitched their tents and took the noon mess.

To have everything in readiness for them was a greater task than can be conceived by any save one who has either done it or closely watched it done. The task was made still harder by the fact that the men did not carry their full packs owing to their lack of physical training. The full pack weighs about 60 lb. Instead of carrying their full



There were worse roads than these

equipment on their backs, however, much of it was transported by the trucks. Even so, it was not found necessary for all of the trucks to make a second trip, and by 10 a. m. the day's work of the trucks was practically over. One or two might make a trip to the nearest town after meat or milk, another might go out on a bridge-building job, but in the main they remained in their parks from 10 a. m. to 5 a. m. the next morning.

Invariably Overloaded

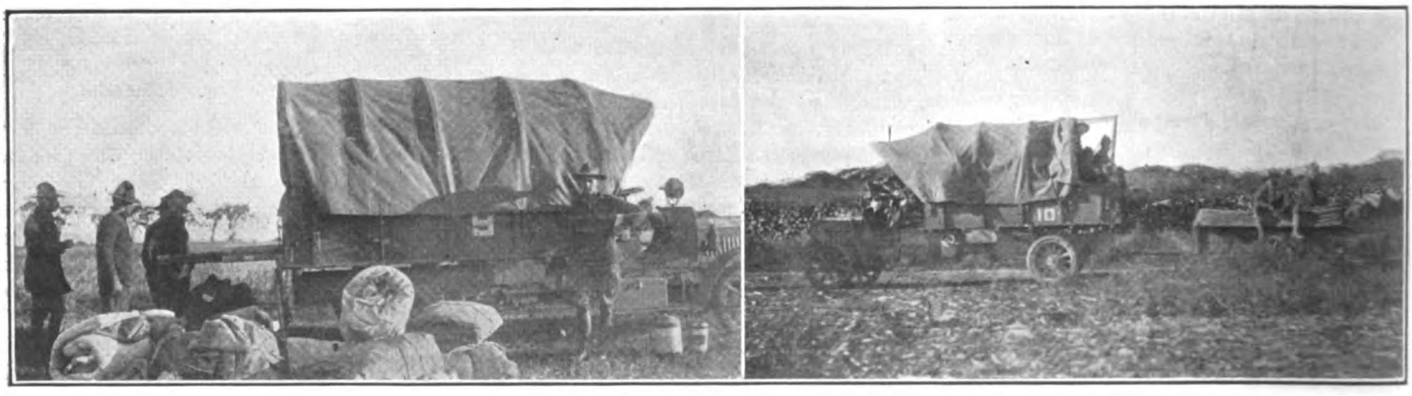
That this amount of work was possible with but twenty trucks is simply explained. They were invariably and excessively overloaded. They are 1½-ton trucks——such is the standard of the army——but they carried in some cases in excess of 3 tons of load. The army contends that 1½-tonners are best suited to army needs, being light and therefore will not injure roads and bridges, as would a heavier vehicle. But, being light, they also have narrow tires, which impose exactly the same normal pressure per inch of width as do those of heavier and wider-tired trucks. Furthermore, their capacity being selected arbitrarily and not in conformance with the requirements of service, they are woefully overloaded, which in a long campaign not only would give rise to great mechanical trouble but would cause the narrow tires to cut deeply into the soft roads, rutting them hopelessly. Only the rolling action of the pneumatics of the large number of passenger cars which attended each camp prevented the absolute destruction of some of the roads in muddy weather.

The above remarks are not intended as a criticism of the excellent staff of officers in charge of the camp, who certainly managed admirably with what facilities they had. Least of all are they in disparagement of the patriotic manufacturers who donated some $50,000 worth of trucks to the cause of preparedness. They are statements of facts that exist and which are brought to light only by experience. Criticism may be reserved for the event of failure to learn the lessons taught.

No. 10 Long-Suffering

One particular case of the hopeless unadaptability of these chassis to the improper conditions of service encountered is that of Packard No. 10. This truck was assigned, with one of the Garfords, to the headquarters camp. Its duty was to move the tents, cots, bedding, blankets, baggage and mess kit of the General and his immediate staff. One of these officers had a Shattuck two-wheeled trailer tent which, with the tent collapsed and his baggage stored within, weighed nearly a ton. Truck No. 10 had also to tow this trailer and to keep its place in the middle of the train withal.

In the earlier camps the headquarters quartermaster-sergeant, who had charge of its loading, did the job in two trips, so that the truck was only moderately overloaded. The officers, however, strenuously and quite justly objected to the delay in setting up the headquarters. The only alternative was to load two overloads on the truck for one load. The loading and unloading detail assigned to



Left—Loading a Packard transport truck at sunrise. Right—Packard No. 10, trailing an officer's camping trailer

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headquarters was obliged to look to the truck for their own transportation also, but this was never considered a load. When the cubical contents of the body and its extended tailboard had been completely occupied by the heavy tentage, baggage and equipment, as many men as could find a secure footing got aboard and the soldier-driver goaded the machine to its task.

That these machines have withstood the terrible abuse to which they are habitually subjected and have successfully negotiated the roughest of country roads and crossed boulder-strewn and hillocked pastures without difficulty is unfortunate. It would have been better had they failed, for there is apt to be too much confidence placed in the ability of motor trucks to endure this sort of abuse.

There was a great deal of very wet weather on the August hike and the roads over which most of the runs were made steadily became poorer with each day's march. The final camp was situated in a pasture on a long muddy lane. This pasture was closely wooded and covered with large and rough boulders, and its surface was badly broken with ridges and hollows. Notwithstanding this, the trucks went in with their loads and took them out next day, going to their appointed places on the field regardless of topography.

Bridges, as a rule, and many of the culverts were amply able to withstand the heavy loads imposed, despite the fact that the army drivers could not remember to slow down when crossing them. Nevertheless, much reconstruction and bracing had to be done and, though a detachment of engineers was with the camp, it all had to be done by the quartermasters.

Here, again, is an argument for heavier trucks for army service. If culverts and bridges do give way under the weight of 1½-ton trucks, and even under field guns, then what matter is it how much heavier either the trucks or the guns are made, as it is but little more trouble to build a 20-ton culvert than it is one of 5 tons' capacity?

Although the trucks which were used were less than one-fifth the number that should have been used according to army regulations, their ability to make two trips in 5 hr., covering a total of 40 miles, shows that in a pinch four trips could be made and twice the number of men served. This is the flexibility of machinery due to its elimination of fatigue. The mule trains made but one trip a day—10 miles—and carried much lighter loads than the trucks.



Smart steel bodies used by southwestern ladies' wear house

Attention to Appearances Pays in Delivery Work

The Kline Cloak & Suit Co., Kansas City, Mo., has had built four bodies for Ford cars to use in delivery service. The bodies are of steel; a particular feature is that the windshield has its lower section rigidly attached to the framework of the car, the upper section hinged to the roof, avoiding rattling. The body is thoroughly reinforced with iron braces, bolted, not screwed. The substantial character of the work is planned to prevent damage to contents in case the machine should overturn.

The rims are demountable and the wheels of natural wood. An extra tire is carried within the machine.

The chauffeurs and helpers are middle-aged men, well acquainted with the city. In the winter they wear gray uniforms trimmed in blue, with gray caps bearing the name Kline on the rim. In summer the coats are removed, the men wearing blue shirts.

Kline's is the first exclusive ladies' wear store in Kansas City to adopt such a delivery system, others using a local package delivery company. The advertisement of the use of its own cars is an important feature, the company being able to advertise that it makes its own deliveries; and the cars themselves—the only olive-green trucks on the streets, bearing the large, well-known signature of Kline's—attract attention. There is no special equipment on the interior, the goods being packed in boxes for delivery.

The Natural Wax or Oil in Cotton Tire Fabric acts as a lubricant and if retained in the fabric allows the tires to endure the heat of midsummer, according to F. C. Millhoff, general sales manager of the Miller Rubber Co., Akron, Ohio. He further states that if this natural lubricant is cooked out in the process of vulcanization it leaves each fiber of cotton brittle and lifeless and unable to cope with the heat of travel added to that of the atmosphere.

Detroit Heating & Lighting Co., Detroit, manufacturer of sheet-metal specialties for motor vehicles, has completed plans for the erection of additional factory structures which will enable it to double its present output.



Pulling out the Garford which was mired at Altoona, shown at the top of page 25. The men at the rope are only taking in slack, as two trucks were required for the up-hill pull

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Devoted to topics pertinent to commercial vehicle operation design and maintenance. Open to the use of all readers. Communications must be accompanied by the sender's name and address, confidential if preferred. No charge is ever made for this service.

MORTALITY OF CITY HORSES

Annual Death Rate High—Most Die in Hot and Cold Months

To the Editor, COMMERCIAL VEHICLE:

I am much interested in securing statistics regarding the mortality rate of horses used in delivery service in New York, Boston, Philadelphia and Chicago during the hot weather. Anything you can give me along this line will be much appreciated.—HENRY T. MYERS, commercial car sales manager, Studebaker Corp., Detroit.

The heaviest mortality of horses occurs during the extremely hot weather of summer and in the winter months when the streets are covered with ice. In Chicago the loss due to the death of horses is said to be $1,000,000 a year, representing a number of 6,800 a year. In New York 20,000 horses die every year. Figures for Boston and Philadelphia are not at hand, but can be obtained from the departments of health in those cities. In New York there are about 110,000 horses, so that the mortality rate is 18 per cent, indicating an average life of less than six years in Metropolitan service.

USERS OF INTERNAL-GEAR DRIVE

Twenty-seven American Truck Builders Employ This Form

To the Editor, COMMERCIAL VEHICLE:

We would thank you very much to give us a list of the motor trucks that are using an internal drive axle.—J. W. FULTON, Fulton Sales Co., Chicago.

A list of American truck manufacturers employing internal-gear drive in their vehicles follows:

American & British Mfg. Co., Providence, R. I.

Anchor Auto Co., St. Louis, Mo.

Bessemer Motor Truck Co., Grove City, Pa.

Bollstrom Products Sales Co., Battle Creek, Mich.

H. G. Burford Co., Fremont, O.

Columbia Motor Truck & Trailer Co., Pontiac, Mich.

Commercial Truck Co., Philadelphia.

Denby Motor Truck Co., Detroit, Mich.

Deneen Motor Co., Cleveland, O.

Duplex-Power Car Co., Charlotte, Mich.

Fargo Motor Car Co., Chicago.

General Vehicle Co., Long Island City, N. Y.

Globe Furniture Co., Northville, Mich.

Hawkeye Mfg. & Repair Co., Sioux City, Ia.

International Harvester Co., Akron, Ohio.

H. J. Koehler Motors Corp., Newark, N. J.

William Landshaft & Son, Chicago.

Nash Motors Co., Kenosha, Wis.

Palmer-Meyer Motor Car Co., St. Louis, Mo.

Palmer-Moore Co., Syracuse, N. Y.

Phoenix Mfg. Co., Eau Claire, Wis.

Republic Motor Truck Co., Alma, Mich.

Sanford Motor Truck Co., Syracuse, N. Y.

Selden Motor Vehicle Co., Rochester, N. Y.

Stewart Motor Corp., Buffalo, N. Y.

Tiffin Wagon Co., Tiffin, O.

E. G. Willingham's Sons, Atlanta, Ga.

TRACK-LAYING TRACTOR MAKERS

Eight Makes Use Caterpillar Type of Driving Members

To the Editor, COMMERCIAL VEHICLE:

Kindly give me the addresses of the firms who build the caterpillar tractor. W. J. SMILEY, Santa Barbara, Isle of Pines, Cuba.

There is only one firm which makes the Caterpillar tractor, the term being the trade-mark name of the product of the Holt Mfg. Co., Peoria, Ill., and Stockton, Cal. Others who build various types of tractors employing the same form of drive, however, are:

Allis-Chalmers Mfg. Co., Milwaukee.

Bates Tractor Co., Lansing, Mich.

C. L. Best Gas Traction Co., Oakland, Cal.

Bullock Tractor Co., Chicago.

Good Roads Machinery Co., New York.

Lombard Tractor Co., Waterville, Me.

Phoenix Mfg. Co., Eau Claire, Wis.

Yuba Construction Co., Marysville, Cal.

PRINCIPLES OF SERVICE POLICY

N. A. C. C. Plan as Indorsed by the International Motor Co.

To the Editor, COMMERCIAL VEHICLE:

Somewhere in your Aug. 1 issue I saw an account of the adoption of the N. A. C. C. standard service policy. What is the text of this policy? I presume that it is based on the standard 90-day guarantee of the chamber. Is it not just a little futile to prognosticate doctrines of this sort when anyone knows that a guarantee such as that adopted by the motor trade is in reality no guarantee at all, and that its best feature is that it really means nothing, if you read it right?—H. C. MERRILL, Cleveland.

The principles of this policy are:

1—To fulfill the obligations assumed under the manufacturer's warranty.

2—To furnish repair parts as promptly as possible at our current prices.

3—To maintain facilities for making repairs, adjustments and do general overhauling in a prompt and competent manner at reasonable charges.

4—To make inspections and adjustments, not necessitated by neglect or abuse, free of charge for one month following delivery of a new car to purchaser, and thereafter at our regular prices.

5—To furnish printed instructions in the operation and care of our cars.

6—Service to be rendered does not include furnishing repair parts or labor without charge, except as provided in the warranty and in the following specific clauses of this Service Policy.

Replacement of Defective Parts

(a) Within ninety (90) days after delivery of a new car to purchaser the International Motor Co. will furnish, free of charge at the factory, duplicate parts to replace any parts as covered by our warranty that are returned to the factory with shipping charges prepaid and which are determined by the company to have been defective in material or workmanship, or it will put such parts in condition as good as new without charge.

(b) Within ninety (90) days after delivery of a new car to the purchaser the dealer will install, free of labor charges, any parts that the factory furnishes or repairs free of cost to replace any parts determined by the factory to be defective, the purchaser to assume cost of replacement parts and installation of same pending factory decision.

(c) The party returning the parts will be notified promptly of the decision of the factory regarding allowance of a claim for replacement or repair of parts returned.

Inspection and Adjustment

(d) Cars brought to service stations maintained by factory, branch or dealer will be inspected and all necessary adjustments will be made as in paragraphs (e) and (f), without charge during the first month after delivery of a new car to purchaser, provided the car has not been tampered with or injured by accident or neglect. After the first month adjustments will be made at the regular charges of the service station.

(e) Inspection includes examination and report of the condition of the car.

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(f) Adjustment includes only such adjustments as inspection has found necessary to put the car in good operating condition.

(g) Every dealer is expected to give the same inspection and adjustment service on the cars made by this company without regard to the territory in which they were bought.

Repairs, Replacements, Etc.

(h) All work not included in inspection and necessary adjustment during the first month, or installation of replacements under the warranty, will be charged for at regular rates.

(i) When any charge work is to be done and the cost can be estimated in advance, the owner, upon request, will be advised of the amount of the charges before the work is begun.

(j) When it is necessary, for the convenience of the owner, to render service at a distance from the service station, the time spent by employees going to and from the job will be charged for at the regular rates of the station, together with all proper expenses of making the trip, cost of shipping parts, if any, and other necessary incidental expense.

Overtime Work

(k) Any overtime, holiday or Sunday work done upon the request of the owner will be charged for at the regular overtime rate.

Instructions in Care and Operation

(l) Instructions in printed form regarding the care and operation of the car and its accessories, and proper method of ordering and returning parts, will be given to the purchaser upon the delivery of the car.

(m) Personal instruction will be given in accordance with the agreement between dealer and customer at the time of purchase.

General

(n) For service and replacements on engine starters, batteries, magnetos, generators, lamps, carburetors, tires, rims or other trade accessories that are not made by the manufacturer of the car, application may be made direct to the nearest service station maintained by the maker of such accessory. Dealers will be provided with a list giving names and addresses of the manufacturers of said accessories.

(o) No promise of service, free repair work, inspection or adjustment, except as herein specified, given or made by the dealer, shall be binding on the manufacturer of the car.

(p) To help the dealer carry out the intent of this Service Policy, the owner is requested to furnish all information necessary to the prompt and proper filling of orders and issuing of credits and to observe the requirements regarding return of parts with claims for replacement.

A guarantee is no better than the guarantor. This being the case, a good guarantee is superfluous and a poor one a fraud, regardless of its wording. Yet, in the case of the standard warranty of the National Automobile Chamber of Commerce we have a guarantee which, while of no more practical value than the guarantor feels disposed to impart to it in his own judgment, and one which, if the guarantor chooses, can be interpreted so as to mean nothing whatsoever, is nevertheless a good guarantee. The best guarantee is the reputation, responsibility, willingness and ability of a manufacturer to make good. The N. A. C. C. warranty is designed as a protection to manufacturers against unreasonable guarantees which, not lived up to, create distrust in the minds of buyers. By its very reserve the N. A. C. C. warranty promotes good will, since almost any manufacturer actually renders more service than he is obliged to under the guarantee. The above service policy is simply an interpretation of the guarantee upon which it is based.

MOTOR TRUCKS USED ON FARMS

Vehicles Have Myriad Uses in Agricultural Pursuits

To the Editor, COMMERCIAL VEHICLE:

Will you please give us all the information you have in relation to the use of motor trucks on the farm?—H. H. HARWOOD, Northwest Buick Co., Seattle, Wash.

It is a rather large order to give all the information in the possession of THE COMMERCIAL VEHICLE on this subject, and as no specific questions are asked it is difficult to more than touch upon a few of the more prominent features of this application of commercial vehicles.

It may be said that motor trucks are used in myriad lines of agricultural work and that there is every reason to believe that their use in this field will be increased, but at present there is nothing like a general use of trucks on farms.

The following are references to articles on the subject which have appeared in THE COMMERCIAL VEHICLE during the years 1915 and 1916:

Sept. 1, 1915, page 28:

James H. Jones, a retired engineer, used a Ford with a 1500-lb. trailer on his dairy farm, on one occasion having taken a herd of fine Guernsey cattle 50 miles from his farm, hauling each animal home in the trailer.

Feb. 15, 1916, page 21:

W. H. Porter, wheelmaker, Lansing, Mich., 2-ton Reo, used for work at factory and in spare time on Mr. Porter's farm, 6½ miles from town. Does general utility work around farm, produce and grain hauling, and is used as a tractor.

Feb. 15, 1916, page 32:

D. Oliver & Sons, Orchard Lake, Mich., use G. M. C. 1¼-tonner to haul fruit to Detroit market, 30 miles distant. Quicker time than by horse or rail enables higher prices to be realized. Netted $1,500 more on the crop.

April 1, 1916, page 23:

T. A. Heeger, chief engineer, North Fort Worth Ice & Cold Storage Co., Fort Worth, Tex., operates the 3½-ton Wichita truck used by the plant on his farm when not in use in ice hauling, using it for farm hauling and as a tractor.

Another Texan uses truck on cattle ranch to bring stock to market, saving fatigue of the animals and therefore realizing more for them on the market.

OIL CONSUMED PER YEAR

Depends Upon Size of Vehicle and Mileage Covered

To the Editor, COMMERCIAL VEHICLE:

I desire to know the quantity of oil and grease used on commercial vehicles during the period of 1 year. I desire also to secure a comparison of performances of different trucks as used in commercial service so as to be able to base a maintenance charge for trucks with the garage maintaining same to provide oil and lubrication.—S. J. HUNT, St. Louis, Mo.

It is as impossible to state what the consumption of oil and grease of a truck should be as to determine how much food a man will eat in a year. If the man is large, hard-working and with an excessive appetite, he will eat a great deal; whereas, if he is slight, leading a sedentary existence and with a poor digestion, he may eat comparatively little. A child will eat less than a day laborer.

Similarly, the consumption of lubricants in a motor truck will depend upon the size of the truck and its motor, upon the miles it runs, the amount of low-gear work it does in traffic, on hills and in sand, and the economy of lubricant which results from the design used. It will even vary with the different kinds of lubricant used.

For this reason, only actual experience with the particular truck in mind can give anything like an accurate or a useful figure. Following are a few examples of oil consumption known to THE COMMERCIAL VEHICLE, which show how great is the disparity:

	Miles per Gallon of Oil
1½-ton Autocar	100
1½-ton Autocar	97
1½-ton Federal	188
3-tonner	60
3-tonner	40
4-ton Mack	22
5-tonner	44
5½-ton Mack	64
6½-ton Saurer	48

From the above it is impossible to draw any intelligent conclusion. So few users keep any accurate record of grease consumption that it is impossible to quote any reliable figures. The best way to determine these points is to operate the truck for a month in regular service and keep a close record of consumption, averaging it on a basis of miles per gallon of oil and per pound of grease. Apply this average to the total expected mileage per year, and the consumption per year results.

STEAM RAILROAD MOTOR CARS

Stanley Motor Vehicle Interests Developing Rail Cars

To the Editor, COMMERCIAL VEHICLE:

I noticed in a recent copy of THE COMMERCIAL VEHICLE that an F. E. Stanley is building railroad motor cars, with his motors operating them.

No address was given for Mr. Stanley and I am interested in this line. Kindly give me his address.—G. P. KURTZ, Buffalo, N. Y.

The Stanley mentioned in the article referred to is the head of the Stanley Motor Vehicle Co., Newton, Mass., builder of Stanley steam motor vehicles.

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Four New Atterbury Models on Same Plan

Flexible Frame and Hotchkiss Drive

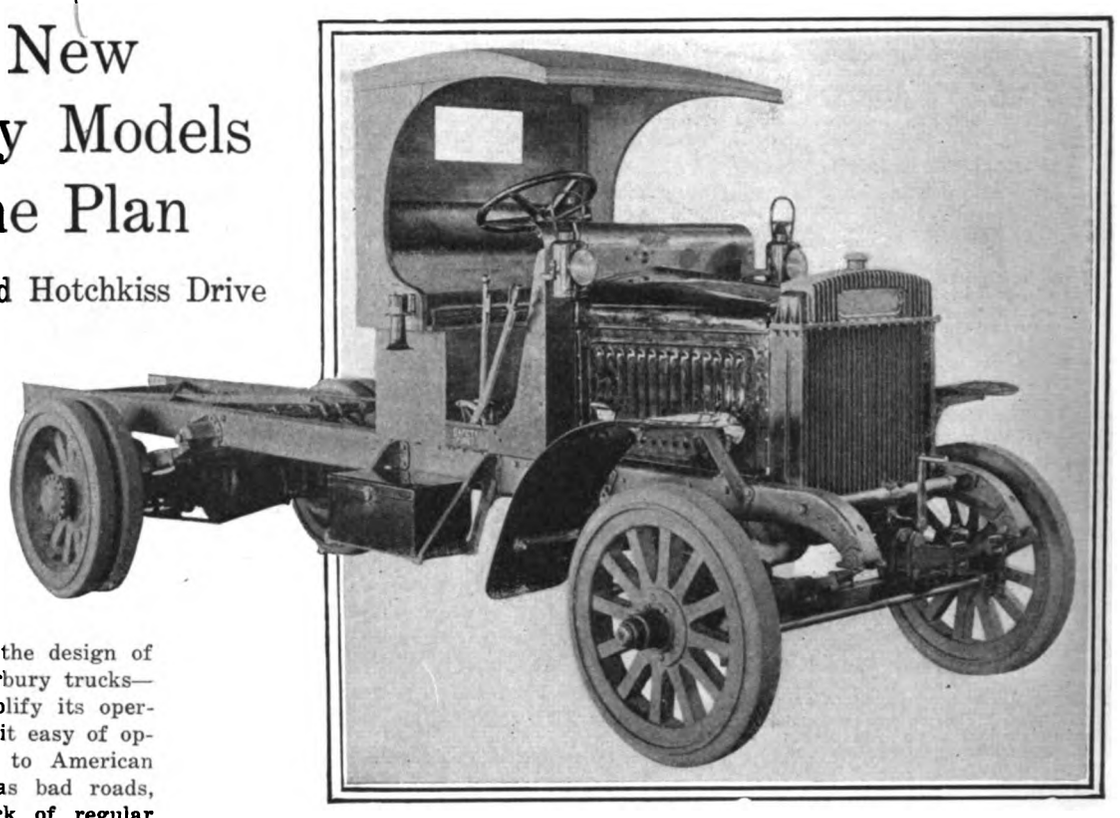


Fig. 1—New Atterbury 3½-ton model, showing neat sheet-metal work, new radiator and construction of frame

FEATURES abound in the design of the present-day Atterbury trucks—features designed to simplify its operation and care, to render it easy of operation and to adapt it to American service conditions, such as bad roads, unskilled drivers and lack of regular care. The new Atterbury trucks, however, are standard in principal points of construction and are the logical successors of previous products of the Atterbury Motor Car Co., Buffalo, N. Y.

Flexible frame construction, unit power-plant assembly, accessible chassis plan and ruggedness of detail suggestive of the British school of engineering are the high spots in Atterbury design. The trucks are worm-driven on the Hotchkiss principle. Capacities remain as formerly, except that a 1½-tonner has been added to the line, so that the Atterbury truck is now available in 1, 1½, 2 and 3½ ton sizes. Chassis layout and most of the structural details of all types are practically identical, the differences being confined mainly to the size and strength of essential members.

SPECIFICATIONS

Capacity in lbs.	2,000	3,000	4,000	7,000
Price of chassis	$1,775	$1,875	$2,375	$3,175
Wheelbase in in.	140½	140½	153½	167½
Tires, front.....	36x3½	36x3½	36x4	36x5
Tires, rear.....	36x5	36x5	36x4d	40x5d
Bore in in.....	3¾	3¾	4⅛	4½
Stroke in in.....	5¼	5¼	5¼	5½
N.A.C.C. hp.....	22.5	22.5	27.2	32.4
Speed, r.p.m.....	1,200	1,200	1,200	1,125
Speed, m.p.h....	16½	15	15	13
Gear-ratio in high gear.....	7¾–1	7¾–1	8½–1	10⅛–1
Final drive.....	worm	worm	worm	worm

In each model the unit power-plant is located under a conventional louvred hood and suspended on three points. All motors are of Continental make, cast in block, except the largest, which is cast in pairs. Centrifugal pump circulation is used for the cooling water, the radiator being of the finned-tube type in a cast and finned casing.

No underpan is fitted, but in lieu thereof galvanized plates are extended from the sides of the crankcase to the frame, leaving the lower crankcase half exposed and instantly accessible. The radiator is mounted on heavy scroll springs to allow for the normal distortion of the frame in negotiating uneven roads.

A Zenith carbureter bolts to the left side, where the valves are located. It is fed by gravity from a tank beneath the seat. A Pierce governor, driven from the timing gears, limits the motor speed.

Fixed spark is employed on all but the largest model, current being supplied by a Bosch single magneto on the smaller ones and on the dual plan by a Bosch magneto and dry battery on the 3½-tonner.

To avoid any excuse for inattention to motor lubrication, a sight-feed oil indicator has been placed on the dash. This operates in conjunction with the Continental circulating-splash lubricating system, by which a double plunger pump, eccentric driven from the camshaft, forces the oil from the reservoir at the bottom of the crankcase over the timing gears and through the rear main bearing, from whence it drains to the splash pits and is circulated throughout the rest of the motor by splash. To render the sight feed readily visible at all times, an opening is provided on the front of the dash so that the light shines through the indicator. At night the light from street lights or passing vehicles serves to illumine it.

From the dry-disk clutch the drive is taken to the rear axle by a four-speed selective gearset and a tubular driveshaft with but two universals. Both clutch and gearset are of Brown-Lipe manufacture.

Four speeds have been provided to achieve greater pulling ability on the lowest gear, since it is lower than that on a corresponding size of three-speed set; easier and less abrupt changes of gear, making for better get-away with less strain; and better fuel economy through a wider choice of gear-ratios to fit the work in hand. Direct drive is in high gear.

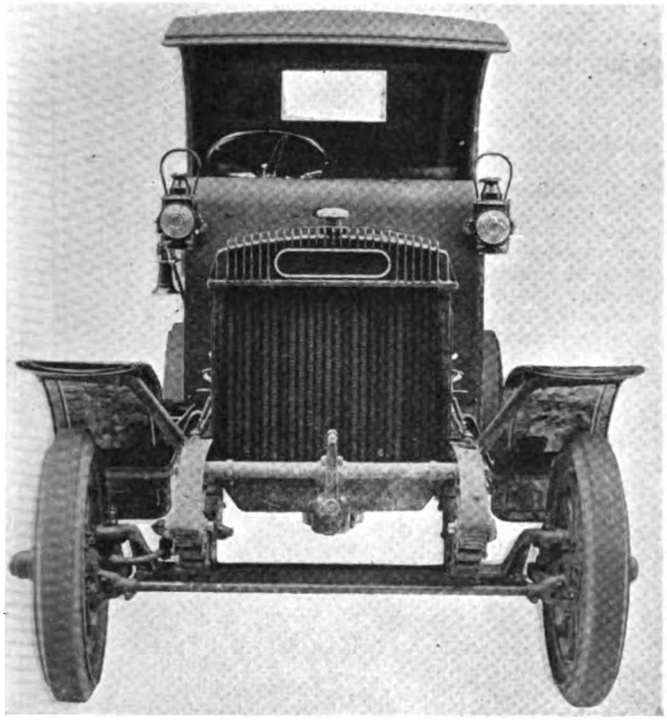
The tubular shaft permits the use of but two universals instead of three, as on some trucks. This would not be practicable with a solid shaft, since to avoid destructive whipping it would have to be too heavy. The tubular shaft achieves great rigidity without being heavier than a solid shaft of similar torsional strength and it permits the mounting of the universals at a distance apart, so that they have less deflection.

The rear axle is a Timken, floating and worm driven. It drives and transmits its torque through the springs, which are provided with shrunk-on bands at their centers to lessen the liability of movement of the leaves at this point; eliminates the center bolt and strengthens them generally. The spring bolts are of exceptional sitze, in order to eliminate the excessive wear at this point, so often found. They are of the self-lubricating type, being hollow and fitted with an oil-saturated wick inside.

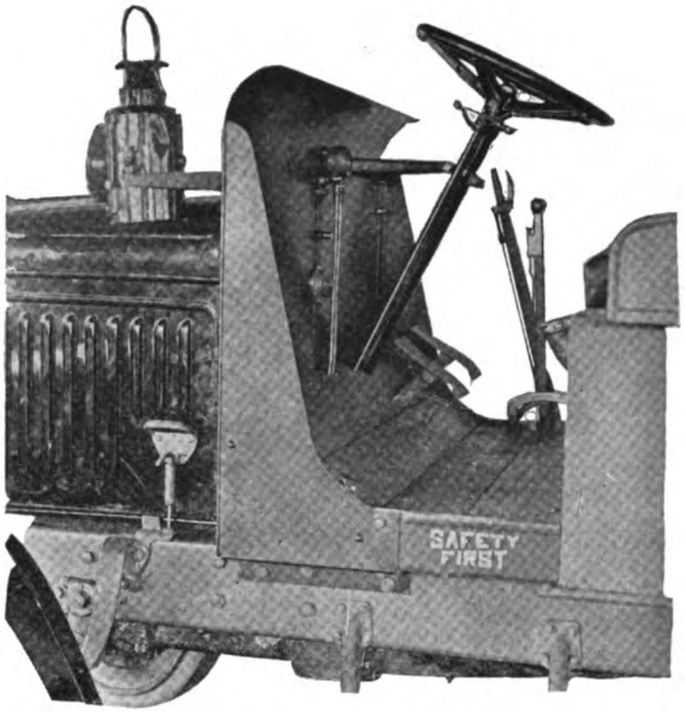
The brakes are of standard Timken

(*Continued on page* 33)

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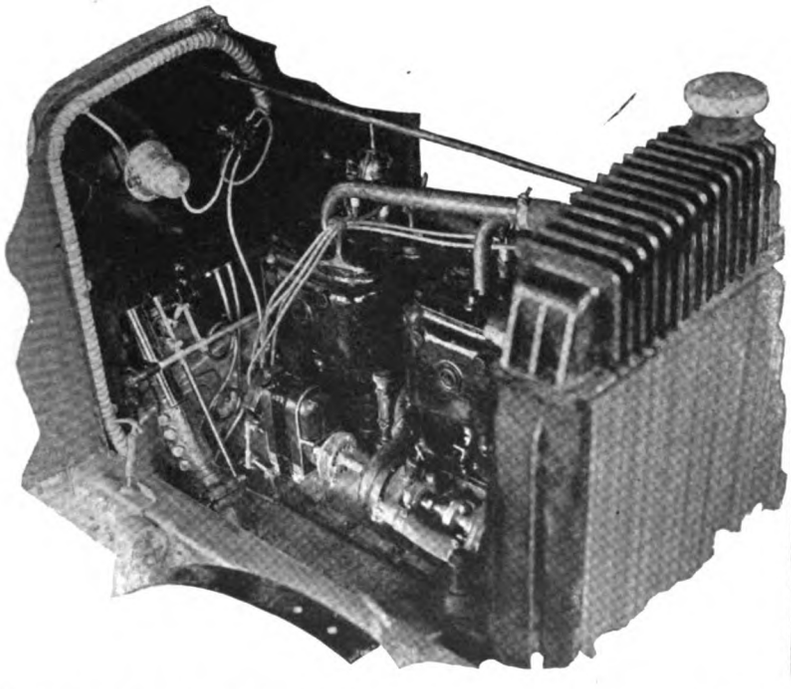
Head-on view of Atterbury chassis, showing straight front axle, tubular frame cross-member and type of radiator

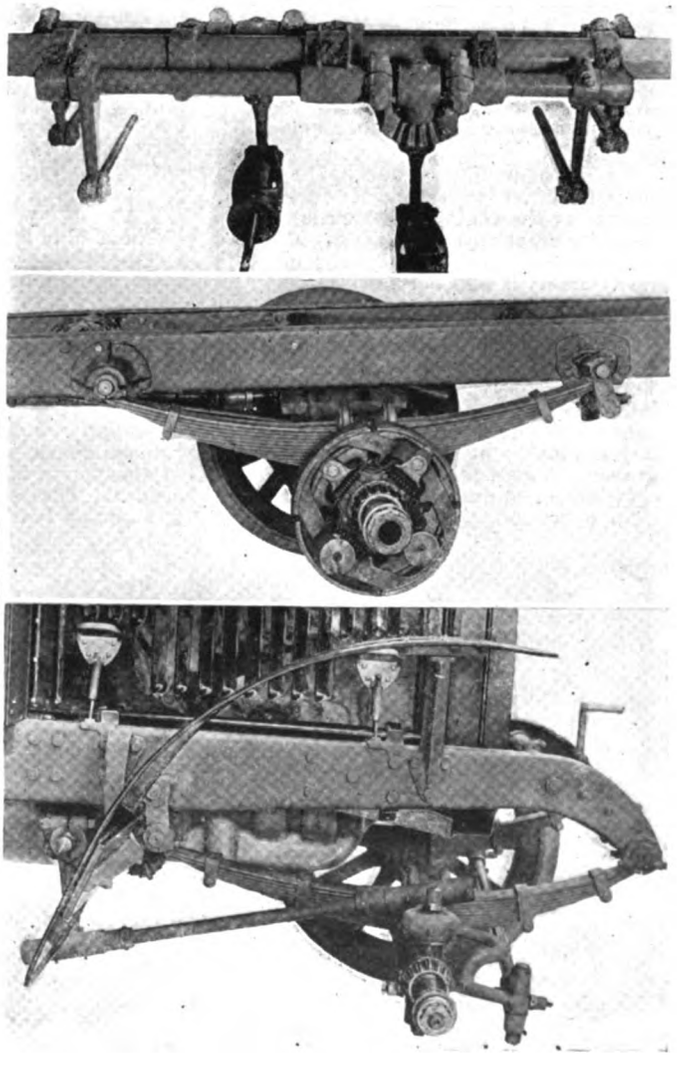


Atterbury cab, showing controls, sheet steel dash, oil sight-feed and Adlake truck lamps

GLIMPSES OF ATTERBURY DESIGN

Below, a view of the engine, showing magneto and water pump drives and accesssibility of the steering gear





To the right, at top, differential type of brake eveners with hand-operated adjustments on pull-rods

At middle, the Timken axle, its brakes and the self-oiled springs through which it transmits driving effort

At bottom, detail of Atterbury front end, showing steering lay-out bolted frame and substantial fender supports

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Accessories for the Truck

DORR-MILLER DIFFERENTIAL

Differing from all previous types of motor vehicle differentials, a new type in which the differentiation is secured, not through gears, but through the friction of steel balls running in grooves, has recently been put on the market by the Miller Transmission Co., Chicago. It has an advantage over former designs in that while the power of the motor is differentiated between the two wheels in the usual manner for corner turning, it will still permit a vehicle to pull out of a hole when only one wheel has traction.

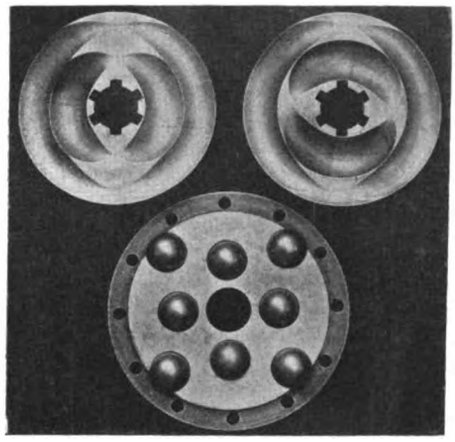


Fig. 1—Elements of Dorr-Miller differential

As shown in Figs. 2 and 3, the device consists of a conventional differential casing, at the center of which is a plate carrying eight steel balls arranged in two concentric circles. These balls move in four crescent-shaped grooves in two disks, one on each side of the plate. The disks carry the ends of the axle shafts. Each groove is deep and wide at its middle, tapering off to points at the ends. The deepest part of the groove and the thickness of the center plate are each one-half the diameter of the balls. When any one ball is at the deepest part of the groove of one disk it is at the end of the corresponding groove on the other.

In operation, the transmission of the motor power through the large differential ring gear to the plate carrying the balls creates a thrust which tends to force the disks apart, causing them to press against grooved washers in the ends of the casing. When the car is running ahead, the plate and the disks revolve as one piece, like any differential, the thrust and torque exerted by each disk and the torque on each wheel being equal.

In turning a corner, the torque on the wheels is unequal, due to the tendency of one wheel to turn faster than the other. This permits the balls to revolve in the grooves in one disk into those of the other, causing one disk to move faster than the other, and similarly allowing the outer wheel to turn faster than the inner.

If one wheel is spinning, the friction induced by the disks arrests the spinning wheel and converts its motion to torque on the stationary one, the spreading of the disks acting as a brake on the spinning wheel because only on that side is there relative motion between the disk and its case.

GOODYEAR HAND-ATTACHABLE CUSHION TRUCK TIRE

Hand-attachable, the new Goodyear cushion tire is designed particularly for motor truck use. It is the successor of the Goodyear cushion demountable tire, and differs from the latter in the base, which is identical in construction with that of the Goodyear S-V solid truck tire. The tread design of the new tire is the same as that of the cushion demountable type, with the exception that the pockets or indentations in the sides which provide accommodation for the displaced rubber as the tire revolves on the street, are changed from a rectangular to an oval shape. The tire is made by the Goodyear Tire & Rubber Co., Akron, Ohio, and is shown in section and entirely in Fig. 5.

STEWART V-RAY SPARK PLUG

The V-Ray spark plug, formerly made by the V-Ray Company, Marshalltown, Iowa, is now one of the products of the Stewart-Warner Speedometer Co., Chicago. The plug, as shown in Fig. 4, differs from the conventional type, in that it has four V-shaped sparking points surrounding the central point. The four sparking points, instead of one, as usual, are intended to insure a continuous spark, even though one or more of the points should become fouled with carbon. The porcelain core of the plug is made of Petriflint, the manufacturing process of which is owned and controlled by the Stewart-Warner Company. A universal terminal cap is employed, which fits almost all of the cable terminals in use. The cap is cone-shaped at the top, and when removed forms a convenient means for cleaning the four sparking points. To clean the points the tapered end of the terminal is slipped over the central point and pushed up slightly and then turned, the rasp-like surface scraping the points and leaving them clean and ready for service.

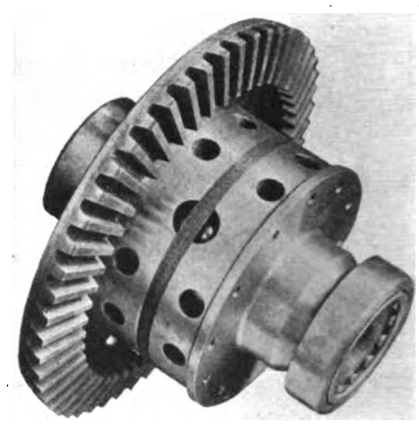


Fig. 2—Dorr-Miller differential complete

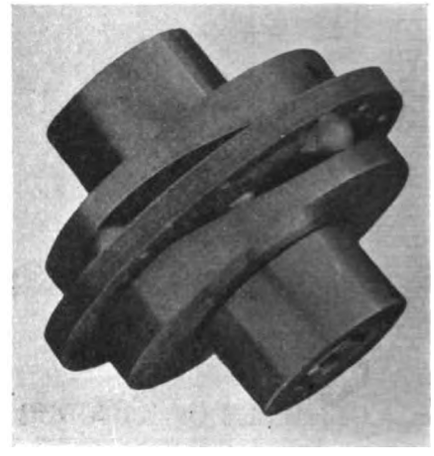
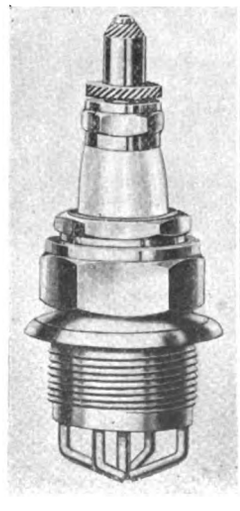


Fig. 3—Differential element of Dorr-Miller unit



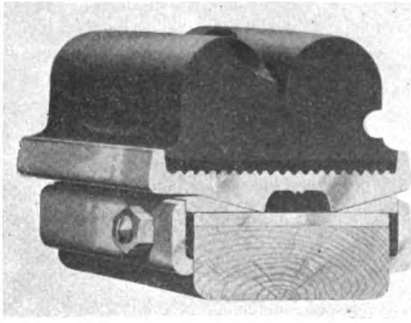


Fig. 4—Stewart V-ray plug.



Fig. 5—Goodyear demountable cushion tire, an improved Motz tire

SIMPLEX MAGNETO HAS FEW PARTS

Simplicity is the outstanding characteristic of the magneto whose name suggests this fact. The Simplex magneto is a new device, produced by the Simplex Magneto Co., New York City. Its simplicity is largely due to the single casting which constitutes the frame and main body of the instrument. This frame, of aluminum, has the pole-pieces for the magnets cast integral with it. It forms a complete oil- and dust-tight inclosure for the armature and the closed ends of the magneto. One of these ends is also formed into a casing for the distributer and breaker box.

The entire Simplex device is assembled by means of screw and clamp connections which require no tools. A mechanical feature of interest is the design of the breaker. This, contrary to the usual construction, acts in an axial instead of a radial direction, so that centrifugal force has no effect upon the speed of breaking or making. This renders the breaker action equally positive at all speeds.

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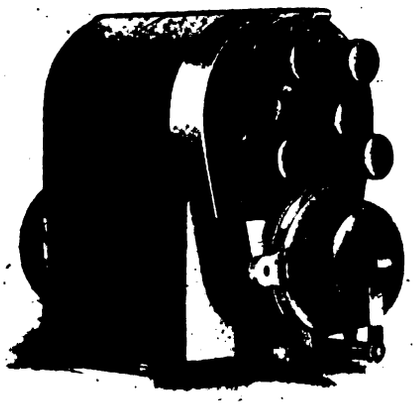


Fig. 6—Simplex magneto ready for installation

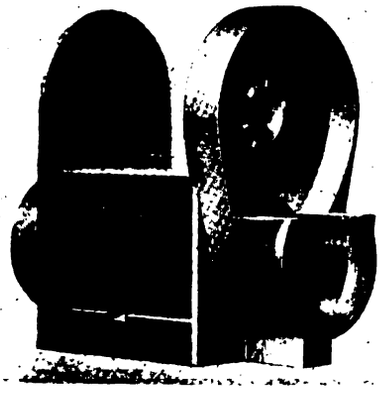


Fig. 7—One-piece cast frame of Simplex

The magnets are pressed over the frame and retained solely by the flat spring clip over the top, which serves to hold the distributer cover in place. The armature is mounted on two ball bearings, both of identical size. It is slipped into place through the breaker box and locked there by a large adjusting nut which acts as the adjustment of the bearings. A knurled lock nut maintains the adjustment.

Into the end of the armature shaft the platinum-headed breaker adjusting screw threads, this screw serving as the fixed breaker point and the retaining means for the entire breaker mechanism. The breaker body consists of a disk carrying a flat spring. This spring has a platinum point riveted to it, its spring tension keeping it normally in contact with that on the end of the adjusting screw. The break is accomplished by the action of a small fiber roller, carried by the breaker body and running over a face cam. There are two protuberances on the cam, so that the points are broken apart twice each armature revolution.

The dust cap over the breaker mechanism is retained by the usual flat clamp spring, this spring being anchored on a post which serves as the stop for the advance and retard movement of the cam plate.

There is the usual slip ring on the armature just behind the breaker, and behind that the spur pinion which drives the distributer gear. The slip-ring brush is carried by the composition cover of the distributer and the gear runs in a bushing contained in the aluminum frame of the instrument, being retained by the composition distributer cover. Either four or six distributer points are provided, according to whether the engine is a four or a six, without any further change in the magneto except the ratio between the distributer gears.

A special feature of the Simplex magneto is the ease with which it may be adjusted, cleaned or have its points filed.

To adjust the armature for end-play, the knurled lock-nut is turned back and the threaded nut which contains the rear armature bearing turned to the desired adjustment, when the lock-nut is again turned up.

To adjust the platinum points the breaker spring is swung out away from the fixed point, and the screw, of which it is the head, is turned in or out, so that the points are 1/64 in. apart when separated.

To file the points the breaker is similarly swung out and a flat or triangular file is used to dress them flat. Removal of the distributer cover opens it entirely for cleaning.

BROWN LUBRICATING BOLT

Designed primarily as a self-lubricating spring shackle bolt, but also applicable to various kinds of mechanisms requiring the continuous feed of fluid oil for internal lubrication, the Brown lubricating bolt is hollow and filled with wicking, accomplishing its purpose through capillary attraction. As shown in Fig. 8, the shank of the bolt is hollow, with one or more holes leading from the inside to the outside surface of the bolt. One end is closed and the other open, but covered by a threaded plug cap.

The lubrication is accomplished through a main reservoir wick of felt which is attached to the plug cap, and feed wicks through the holes to the bolt exterior. The main reservoir wick is under a slight compression which forces it against the interior of the bolt. The feed wicks are in contact with the felt one, and carry the oil out to the bolt exterior by capillary action. The felt wick is made a sucking fit in the hollow bolt, and thus forms an efficient pump for filling the bolt with oil, the cap plug acting as a handle.

In filling, oil is put into the bolt with a can or oil gun, after which the felt wick is inserted and worked back and forth until thoroughly saturated. Enough pressure can be exerted in this operation to force the oil to the feed wicks and in turn saturate them. By screwing in the cap plug the wick is put under sufficient compression to start the flow of the oil automatically. The bolt is made by the Brown Company, Syracuse, N. Y.



Fig. 8—Brown magazine-oiling spring bolt

Four Atterbury Models On Same Plan

(*Continued from page* 30)

duplex type, consisting of double internal shoes expanding for the full width of each drum. They are operated through equalizers of the differential type, comprising bevel gear segments, and adjustable by simple friction-retained hand nuts on the pull-rods.

All Cross-members Tubular

Every cross-member in the Atterbury frame is tubular and free to turn in its bushing. The side-members are of pressed steel with tapering ends, but parallel throughout their length. Diagonal bracing is effected by crossed steel straps at the rear and all brackets and fittings are secured by bolts, not by rivets. The only rivets in the Atterbury frame are those which secure the forged ends of the integral spring horns. No holes are drilled in the top or bottom flanges of the frame.

The front axle is a Timken of I-beam section and it is straight from end to end, the old dropped design being unnecessary because of its position ahead of the engine instead of under it. Roller bearings are not only used on the wheel spindles but at the tops of the knuckles as well, to secure ease of steering. The tie-rod is located in front of the axle, so that the continuous stress is tension instead of compression, so that there is no tendency to bow or bend the rod.

The steering gear is located on the right side, instead of the conventional left-side mounting, and the levers are outboard, also on the right. The throttle lever is mounted below the steering wheel and there is also a foot throttle. The clutch and brake pedals are fitted with cast rocking pads of large size.

The cab is protected by a stiff steel dash which carries the Adlake side, and the front fenders are also of plain flat steel, sharply curved and supported by heavy brackets.

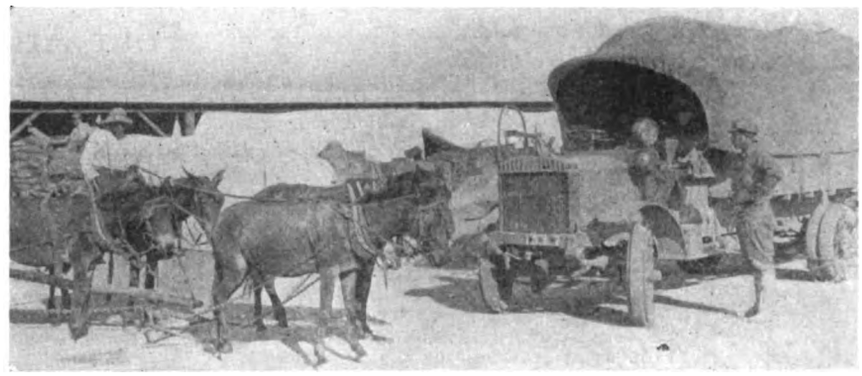
Fuel Tank Easily Filled

The gasoline tank holds thirty gallons of fuel. Although located in the conventional position, under the seat, it is easy to fill, since the filler cap projects through the front of the seat. It has a large strainer at its bottom and a shut-off handle. This is so arranged that a reserve supply is normally trapped at this point and is available by turning the handle.

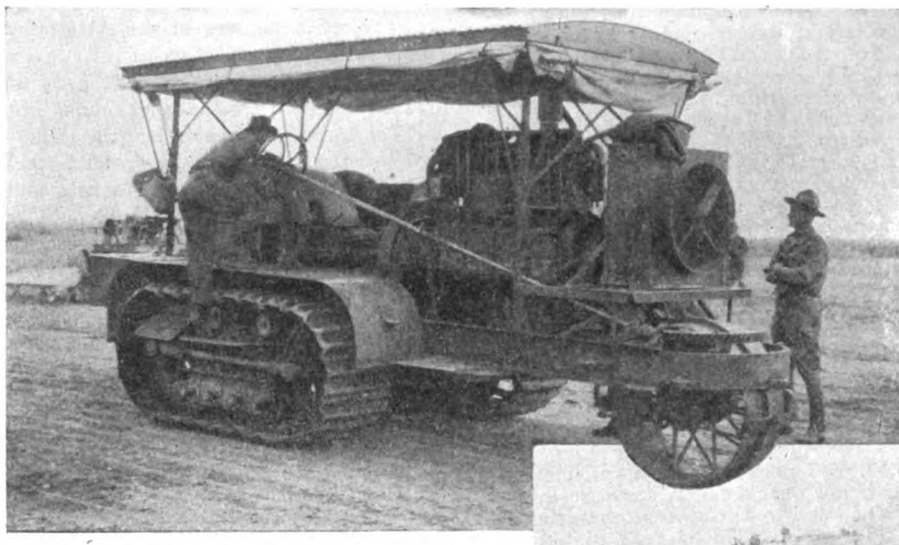
A tool box is applied to the side of the frame on the right side, there being no step on this side. Either an open seat or a cab with an attached top is offered, at the purchaser's option.

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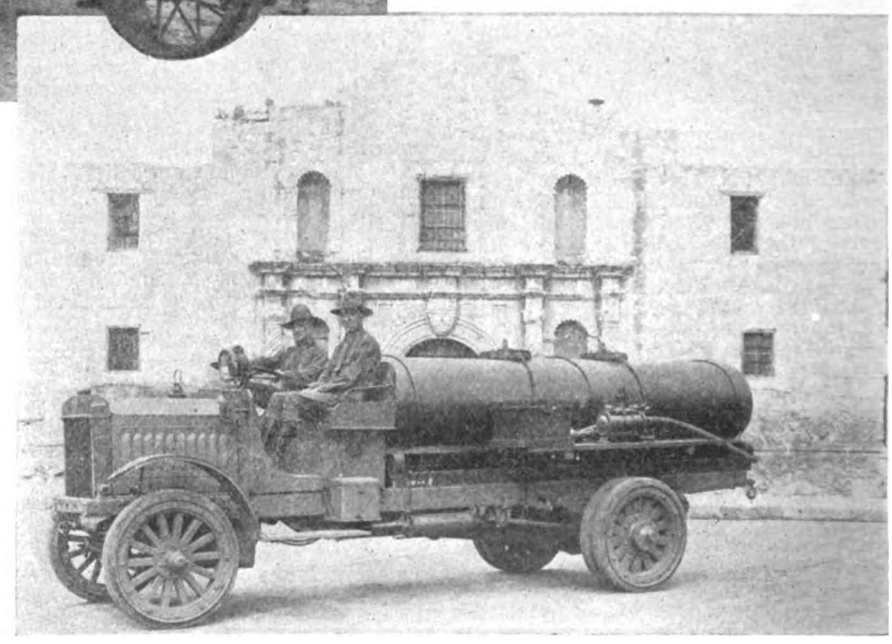
Where Mules Faint and Railroads Avail Not



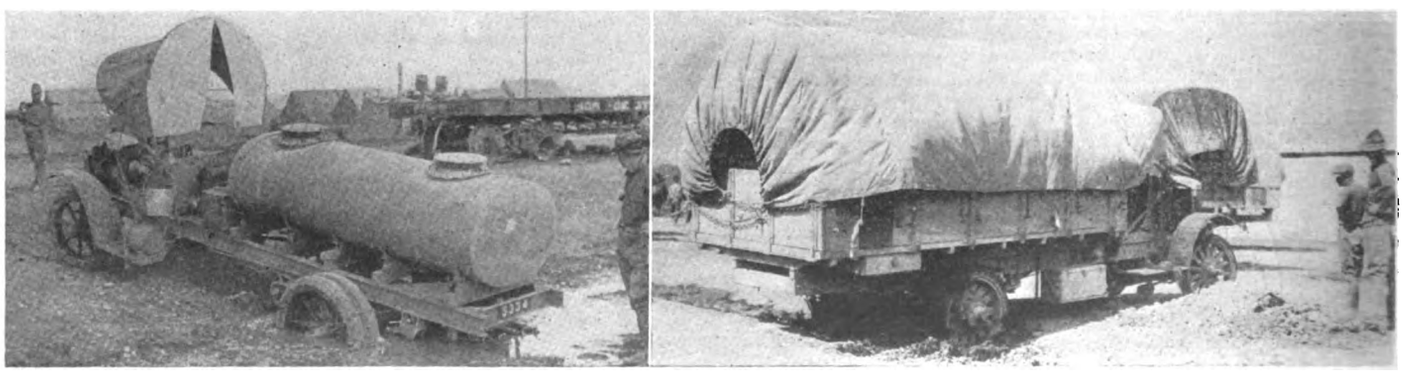
The army mule meets his welcome nemesis



Type of Holt caterpillar tractor with which Uncle Sam is building roads in Chihuahua for the passage of his motor trucks



Our soldiers in Mexico and on the border are in a hot, arid country and fresh water supply is important, hence the Riker tank trucks



Why road work in Mexico is of great importance. These 3-ton trucks, a White tanker and a Riker transport truck, are mired within hailing distance of the main base at Columbus, N. M.

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Army Trucks Move 1,000 Men 200 Miles in a Day and a Half

At the conclusion of the movement of 2000 men across the rough roads of the Texas-Mexico border for a distance of 200 miles in 36 hr. by means of 132 gasoline trucks, Col. H. L. Rogers, Chief Quartermaster of the Southern Department, declared that the trip had proved conclusively that a large body of troops can be moved by gasoline trucks for long distances very effectively. The cost of the experiment is to be tabulated so that the figures may be compared with the cost of a like movement by rail. It is thought that the motor truck method will prove considerably cheaper. But no matter whether it proves cheaper or not, it is clear that the alternative of travel by rail is not always offered. Indeed, in regions like the Mexican border, where railroads are few and far between, the motor truck offers the only practicable means of moving large bodies of troops rapidly.

Four companies of trucks were used, each company being made up of thirty-three trucks. Of these, thirty in each company are for the transportation of troops, each truck seating twenty soldiers, the remaining three trucks carrying field equipment and kitchens. For the movement of troops shorter distances thirty-five men can be crowded onto each truck.

This experimental trip was in charge of Capt. Harry A. Hegeman, and he was complimented by General Funston upon the efficiency with which the truck train was handled. The train left Eagle Pass at 12.30 p. m. on Wednesday, Sept. 6, arriving at Castroville, a short distance from San Antonio, at 4.30 p. m. Thursday afternoon, where camp was pitched for the night. The next morning the train pulled into Camp Cecil A. Lyon.



One of the Packards being used by the National Guard of New York on the border and in work about New York City

A record has been established in overland transportation of troops. The distance from Eagle Pass, where the two Kansas regiments were stationed, to Castroville is about 159 miles. The trip was made in a little over 28 hr. This includes the time spent in a one-night camp at La Pryor and the halts made for meals. The run on into Camp Cecil A. Lyon was easily made Thursday afternoon, completing the 200-mile trip within 36 hr.

U. S. Building Border Roads

Down in Mexico during the summer months Uncle Sam has been demonstrating his skill as an emergency road-builder. In and around Columbus, N. M., and for a considerable distance across the border he has worked wonders with the roads over which supplies and munitions must be carried to his grim, determined boys in khaki.

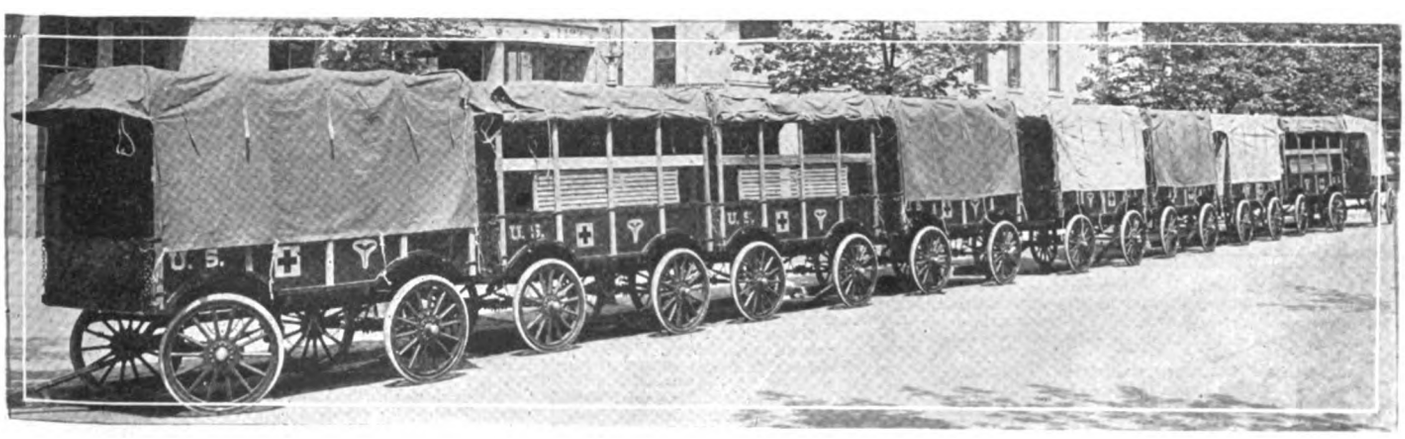
Between advanced types of road-building machinery and the use of motor trucks the soldier-workers have been able to transform many miles of rough, rutty Texan and Mexican highway. A fleet of small scrapers and a number of big side-conveyor type of graders have been kept busy ever since General Pershing's punitive expedition swept across the international line in pursuit of the Villista raiders of Columbus.

Special Service

(*Continued from page* 24)

road station to the mine with machinery.

The Knox tractor is steel-shod throughout, and the semi-trailer load also rolls on broad, practically indestructible steel tires. The power wheels of the tractor itself, as shown by the illustrations, are equipped with diagonal steel cleats that insure traction even under the most unfavorable conditions. The differential lock that destroys the action of the differential whenever one driving wheel begins to spin on any of the rocky ledges on the many steep hills proved a valuable feature. The hydraulic brakes give a much-needed degree of braking control on the down grades.



Trailmobiles used by the Medical Corps as ambulances. They are towed in long trains such as this by trucks

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Men and Makers



BUICK MOTOR CO., Flint, Mich., has prepared plans for the immediate construction of a four-story office building on the site of the present office structure. The new building will be 242 x 50 ft. and will be of reinforced concrete, to cost approximately $240,000. Work will be started during the month of September and it is expected that the structure will be completed by the first of the year.

Kissel Motor Car Co., Hartford, Wis., is adding two more factory buildings to its plant in that city. When these are completed more than 60,000 sq. ft. of floor space will have been added to the floor area of the factory during 1916. Still further factory expansion plans are now under way. The two buildings will have approximately 14,000 sq. ft. of floor space, and include enlargements of the sheet-metal and body-building shop. The former addition will be 77 x 123 ft. and the latter 40 x 100 ft.

Essex Motor Truck Co., New York City, maker of the new Rainier ½-tonner, as described in THE COMMERCIAL VEHICLE of Aug. 15, 1916, is about to move its office from 299 Madison Avenue to 1649 Broadway. The company plans the erection of a factory structure in Flushing, L. I. The building will be one story in height and of modern factory construction, with a saw-toothed roof.

Peerless Motor Car Co., Cleveland, Ohio, is planning the construction of several additions to its present plant, including two three-story additions and one entirely new structure. Work on the new buildings will begin immediately.

The New York City White Branch will soon be removed from its present location at Broadway and Sixty-second Street to a point outside of the present circle in which most of the motor vehicle companies' offices are located. The White company has just acquired control of a plot on the northwestern corner of Fifty-seventh Street and Park Avenue, and will proceed at once to erect on this plot a new structure to be used exclusively for its salesroom and offices.

West & Maginnis, 1790 Broadway, New York City, are now handling the line of Horner 1-, 1½-, 2-, 3- and 5-ton trucks in the Metropolitan territory. The Horner truck is made by the Detroit-Wyandotte Motor Truck Co., Wyandotte, Mich.

Laurence Motor Co., Columbus, Ohio, is the name of a new concern organized at 165 North Fourth Street to handle Republic and Vim trucks in nine counties in central Ohio. Y. B. Jones is general manager. It is the intention to operate a service department in connection with the sales department.

Blair Motor Truck Sales Co., Columbus, Ohio, has opened a salesroom at 60 East Spring Street to act as distributer for Blair motor trucks, made at Newark, Ohio.

Jockers & Stack, Studebaker retailers at 68 Broadway, Borough of Queens, New York City, will erect an additional building, 50 x 150 ft., to their present quarters.

Crown Motors Corp., New York City distributer of the Kisselkar line of worm-driven trucks made by the Kissel Motor Car Co., Hartford, Wis., has leased new quarters at 140 and 142 West Forty-second Street.

Commercial Motor Sales Co., Columbus, Ohio, has recently been formed to handle the sales of Bessemer motor trucks in the central Ohio territory.

Sewell Cushion Wheel Co., Detroit, is erecting a new reinforced concrete building, 71 x 74 ft., three stories and basement, in the rear of its present property at the corner of Gratiot Avenue and Beaufait Street. The completion of the building will give the Sewell company four times as much floor space as it now occupies, thus enabling it to carry a large reserve stock of materials entering into its product and at the same time to increase its production schedule sufficiently to meet the demands. All of the first floor will be used as a machine shop and an assembling department. The second floor will be used for the general offices of the concern and for the manufacturing and woodworking departments.

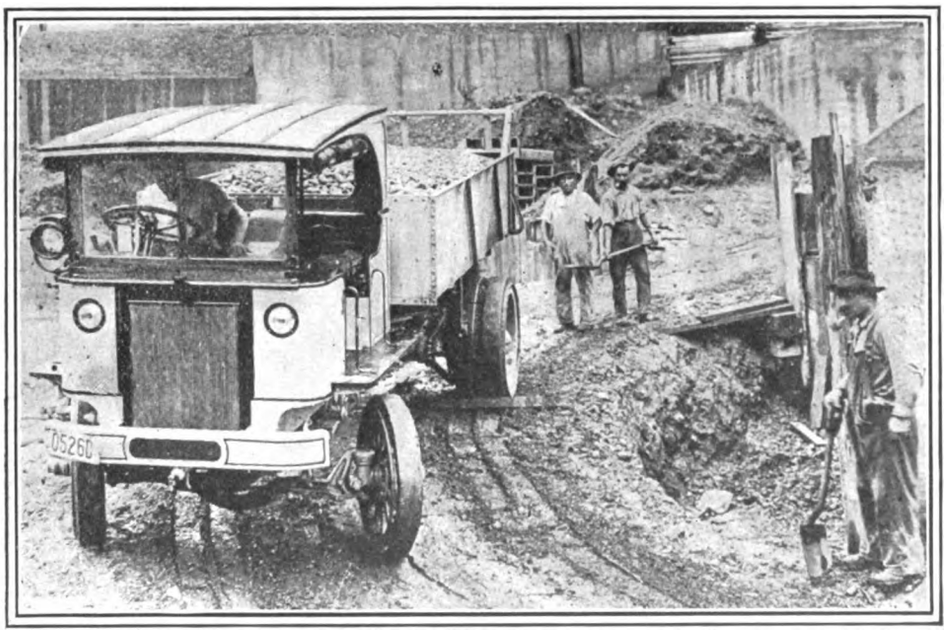
Torbenson Axle Co., Cleveland, Ohio, until Sept. 1 known as the Torbenson Gear & Axle Co., is rushing to completion its new factory on East One Hundred Fifty-second Street. The new buildings now nearing completion include a machine shop with 12,000 sq. ft. of floor space, another machine shop with 10,000 sq. ft. of floor space, one warehouse with 10,000 sq. ft. of floor space and another with 4000 sq. ft. of floor space, and one other machine shop with 15,000 sq. ft. of floor area. An additional machine shop with the same area as the latter will also be added at the earliest opportunity.

Schwarz Wheel Co., Philadelphia, Pa., has purchased 6 acres of land at Holmesburg, near its present plant. Additional factory structures will be added on the new plant within the next few months.

Falls Motors Corp., Sheboygan Falls, Wis., has experienced some delay in starting the construction of its new assembly shop and repair shop. Bids opened in August were rejected and new bids were called for. These closed Sept. 1, but the awards have not yet been made.

Covert Gear Co., Lockport, N. Y., formerly known as the Covert Motor Vehicle Co., is rushing to completion an additional factory building estimated to cost in excess of $50,000. It is expected the structure will be completed about Oct. 1 next and will be devoted at once to the manufacture of Covert gearsets, which henceforth will be the sole product of the organization.

Abbott Downing Co., Concord, N. H., one of the best known establishments in the country, for the past 50 years building wagons, has decided to open salesrooms at Boston, where it will market truck bodies. A lease has been signed for a building on Brookline Avenue there and the executive offices will move there



The 6-ton Garford shown in the above illustration is said to have performed the remarkable feat of backing out of a 32-per cent grade leading from a building excavation with a load in excess of its rated 12,000-pound capacity. It is shown part way out of the excavation in the above view. The vehicle is owned by J. C. Coleman, Roxbury, Mass., a suburb of Boston. Mr. Coleman had previously tried to remove the excavated material by means of horse wagons, but these failed because of the steep ascent from the bottom of the excavation to the roadway and deep sand and débris over which the run had to be made. He was considering the erection of a derrick and hoisting apparatus to take the material out by the bucketfull until he arranged with the Boston office of the R. E. Taylor Corp. for a demonstration of the Garford truck shown above, which satisfactorily performed the work

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shortly. The present plant will be continued for the production of the bodies. For some time the officials of the company have had under consideration the building of complete motor trucks, and they have not yet abandoned the idea. Much will depend upon the success of the present undertaking.

Smith Form-a-Truck Sales Co. of New York has opened a Philadelphia, **Pa., branch** and service station at 2121 **Vine Street.** W. H. Durphy has been appointed district manager at the new branch.

The Redden Boston Sales Co. was organized last week to handle that line in Massachusetts, with headquarters at Boston. J. B. McMahon, Jr., formerly manager of the New York branch, and N. J. Wallis, a Boston man, formerly transportation expert for big business houses, comprise the company. Offices have been opened at 755 Boylston Street. Salesrooms and a service station will be secured later.

B. F. Goodrich Co., Akron, Ohio, has plans prepared for the erection of new plant buildings to cost $500,000. It is expected these will be erected in the next few months. One of the new structures is to be built south of the present factory No. 10 and is estimated to cost $415,000. It will be six stories in height and will be used for general factory purposes. An addition to plant No. 9 will cost $44,000 and another addition to factory No. 10 will cost $38,000. Both of these added structures are to be one story in height.

Goodyear Tire & Rubber Co., Akron, Ohio, is planning the erection of a plant in East Toronto, Ont., **Canada, to cost** approximately $750,000.

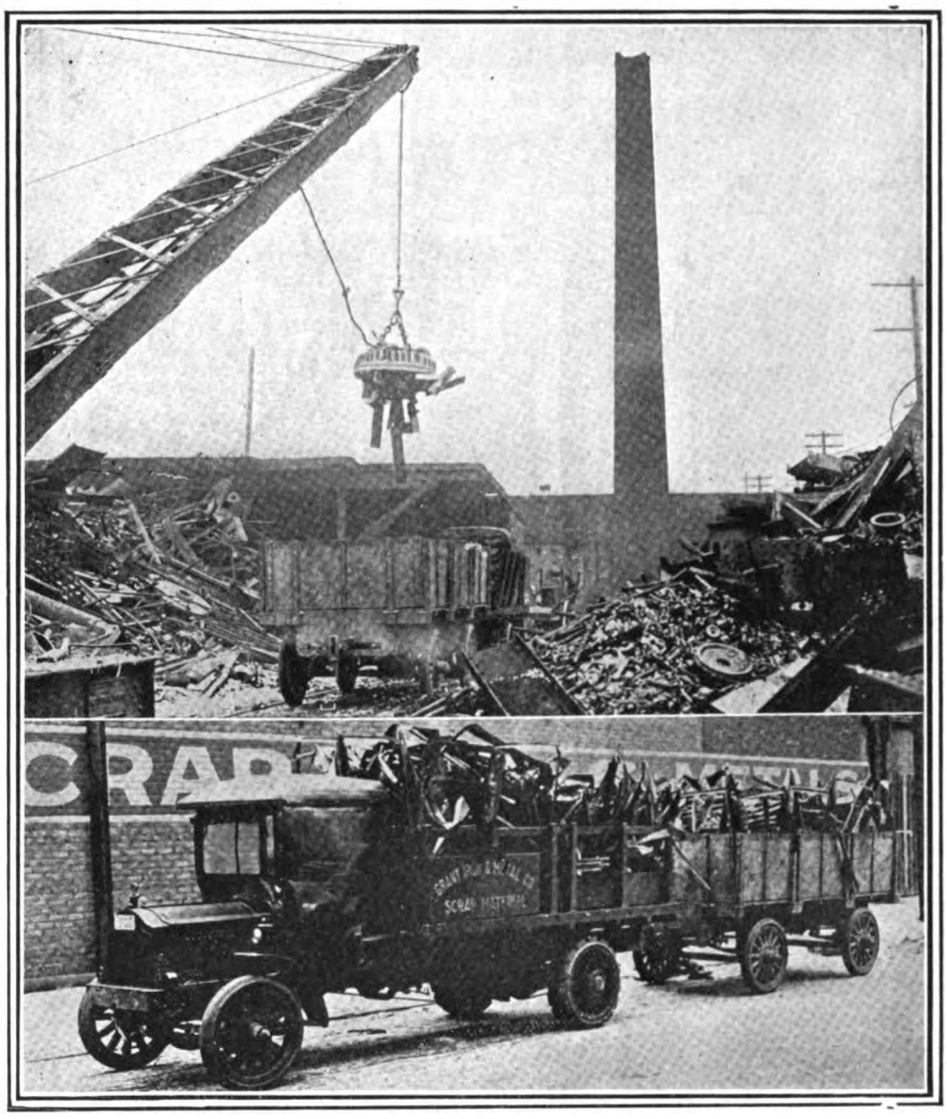
Dann Products Co., Chicago, maker of the Dann spring insert, has plans prepared for the erection of a new plant in Cleveland, Ohio, in which it will also manufacture a combination graphite and metal bearing which, it is claimed, will not require lubrication. Three acres costing approximately $17,500, have been purchased on East One Hundred Fifty-second Street, adjoining the new plant of the Jordon Motor Car Co. The estimated cost of the new Dann plant exceeds $100,000.

Modern Electric & Machine Co., Indianapolis, Ind., is again **at the point of** doubling its plant, as was necessary the first of the year, in order to take care of the increased demand for its patented leak-proof piston ring, known as the R. & M. conform.

Piston Ring Co., Muskegon Heights, **Mich., has practically** completed the construction work on its new four-story factory and has begun the installation of machinery. Machine shops of the most modern lay-out will occupy the greater part of the new structure.

Railway Materials Co., Stevens Point, **Wis., has opened a new department for the manufacture of fuel-oil furnaces for tempering** motor vehicle springs and steel forgings. The necessary equipment is now being installed and a large production is being arranged for to take care of the large volume of orders already on hand.

H. B. Dwyer has been appointed district supervisor of service for the New York City branch of the Studebaker Corp., Detroit. Mr. Dwyer was formerly district supervisor of the Atlanta, Ga., branch of the same concern. This latter position is now being filled by Guy Finn, who previously was service representative, with headquarters at Atlanta.



One of the new 3-ton worm-driven Packards owned by the Grant Iron & Metal Co., Detroit, has been able to handle 5½ tons of scrap metal on each of its trips by the use of a 2½-ton four-wheeled Troy trailer as shown above. The upper view shows the unit being loaded in the yard of the Grant company with all sorts of odd-shaped pieces of scrap material by means of an electric travelling crane with a magnet pick-up

Edward P. Strang, district sales manager for the Deneen Motor Car Co., maker of the Denmo truck, was in Columbus, Ohio, recently to establish agencies in the central Ohio territory. One of the new trucks was shown at the Ohio State Fair.

Edward F. Drew and **Paul B. Donaldson**, formerly with the Chase Motor Truck Co., Syracuse, N. Y., under H. C. Boulden, accompanied the latter when he became general sales manager of the Selden Motor Truck Co., Rochester, N. Y.

Clete Mulick has been appointed assistant branch manager for the Minneapolis, Minn., territory of the Studebaker Corp., Detroit. He succeeds L. C. Stevenson, who has taken a large dealer's contract with the Studebaker company in the State of Montana. Mr. Mulick was formerly assistant manager at the San Francisco, Cal., and Portland, Ore., branches of the same company.

P. L. McKinney, sales manager for the Beacon Motor Car Co. of Boston, Mass., for many years when it was known as the Peerless Motor Car Co. branch, has moved to Manchester, N. H., where he has opened salesrooms to handle the Peerless trucks in Maine and New Hampshire as a dealer.

J. B. McMahon, Jr., manager of the New York City branch of the Redden Motor Truck Co., Detroit, has formed the Boston Sales Co., with N. J. Wallis of Boston, Mass., to handle the sales of the Redden Ford truck adapter in the Boston territory.

L. R. Smith, formerly western representative of the Eisemann Magneto Co., on Sept. 15 became sales manager of the Buda Co., Chicago, manufacturer of Buda motors.

L. Meyrick has been appointed general superintendent of the Ferro Machine & Foundry Co., Cleveland, Ohio. He was formerly with the Lavine Gear Co., Racine, Wis.

The Annual Firestone Officials' Outing was held at the home of Amos C. Miller at Castalia, Ohio, on Saturday, Aug. 26. Firestone foremen, superintendents and officials to the number of 225 were present. Mr. Miller is vice-president of the Firestone Tire & Rubber Co. and his large farm offered an ideal gathering place for the festivities of the day. The run between the factory home office and the farm was made in fifty passenger

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cars. On Saturday afternoon the men enjoyed themselves in athletic games and later journeyed to Cedar Point, near Sandusky, where they were the guests of President Firestone. Bathing was enjoyed in the waters of Lake Erie. Supper was served at the Hotel Breakers there, and after breakfasting at the same place on Sunday morning, the party left for Akron, arriving home late Sunday afternoon.

U. S. L. Directors were Elected at the recent annual meeting of the stockholders of the U. S. Light & Heating Corp., Buffalo, N. Y., as follows: E. H. Gold, J. A. Smith, R. C. Caples, H. W. Farnum, A. H. Ackerman, C. L. Lane, K. H. Addington, J. A. Roberts, Conrad Hubert, G. G. Shepard and E. K. Gordon.

C. A. **Dunkelberg**, treasurer of S. F. Bowser & Co., Fort Wayne, Ind., has resigned and is succeeded by W. G. Zahrt. The latter has been connected with the Bowser concern for 12½ years and Mr. Dunkelberg for 17 years.

A. K. Hebner, formerly service supervisor of the Hyatt Roller Bearing Co., Detroit, finished his duties with that concern on Sept. 1 to become general manager of the Bearings Service Co., which will hereafter handle the joint service of the Hyatt, Timken and New Departure companies.

L. P. Jones, formerly connected with the American Bronze Co. for 5 years, the last 3 of which were spent in Detroit as western manager, has resigned to join the Federal Brass Wks., Detroit.

John W. Brown Mfg. Co., Columbus, Ohio, maker of motor vehicle lamps and accessories, has installed a number of electric furnace ovens which will enable the capacity of the plant to be more than doubled.

Goodyear's Home-building Plan has proven so successful that an addition of 350 acres has been just made to the 100 acres originally allotted. The system was originated and put into operation 3 years ago by President F. A. Seiberling in an effort to help Goodyear workmen to become home owners without the prohibitive down-payments required in the usual real estate business methods. The new acreage just obtained has been divided into 1500 additional lots, none of which are less than 50 ft. in frontage, and houses will be erected upon them in the course of time. The new extension to Goodyear Heights, as the tract is called, is laid out to conform with the ideas of the city planning commission and will constitute a permanent resident district in the direct path of the city's residential development.

Tire Exports during the 12 months ending June 30, 1916, were valued at $18.000,000, according to an official of the Goodyear Tire & Rubber Co., Akron, Ohio. This is four times the amount exported during the preceding year and shows that the business in American tires abroad has evidently been placed upon a very satisfactory basis. A substantial increase is noted in the South American business.

The Factory Product Routing Method now in operation at the plant of the Johnson Bronze Co., New Castle, Pa., is such that it is possible to know where each piece of work is at any particular time and just when each order will be shipped. It is not necessary for the superintendent to worry over the dispatching and routing on any job, as this is taken care of by the planning department, which sees that after the work is once put in progress it automatically travels from one machine to another. The workmen at the factory are all operating under a bonus system, which has increased the output to almost double with the same number of men and with the same machinery.

Salaries of Packard Soldiers who attended the military training camps or those who joined the militia for service in the field were to be paid for 2 weeks in addition to the pay over the period of such vacation, as under the rules of the company, they were regularly entitled to. Men who left the employ of the Packard concern to serve in the field were promised that their positions would be held open for them upon their return, whenever that may be, or that they will be given other positions carrying equal pay. This agreement was contained in a letter from Alvin MacCauley, president of the Packard company, to the heads of all the departments of the concern and was written under date of June 21, 1916. This letter is reproduced in full in a small booklet recently issued by the Packard company in answer to a statement which appeared in one of the Detroit newspapers that the Packard company had deceived its employees by promising that during absence on military duty their salaries would be continued at full and that it had failed to keep its pledge. The booklet above mentioned and the reproduction of the letter concerning the length of time during which pay was to be given men who joined the colors were published to prove that the Packard company had kept its promise, other reports notwithstanding.

Crude Rubber Received from the East is about three times that secured from the forests of South America, according to an expert of the Goodyear Tire & Rubber Co., Akron, Ohio. Ten years ago but a small fraction of the supply was derived from the plantations in the East, which deliver cultivated rubber, free from dirt and less expensive than the South American product.

Salaries of Pierce-Arrow Soldier Recruits who were called for duty at the Mexican border will be paid by the company during their absence on the basis of full wage for married men and half wage for single men, subject to the deduction of the sum received from the Federal Government. In addition, their former positions are guaranteed them upon their return. At a recent meeting of the Pierce-Arrow directors in Buffalo it was further decided to make no distinction between the married men and the single, so that the latter will now receive full instead of the half wage, with the deduction noted above. The salaries of about eighty Pierce-Arrow employees are now being paid each month to those to whom the enlisted soldiers have requested their earnings to be given.

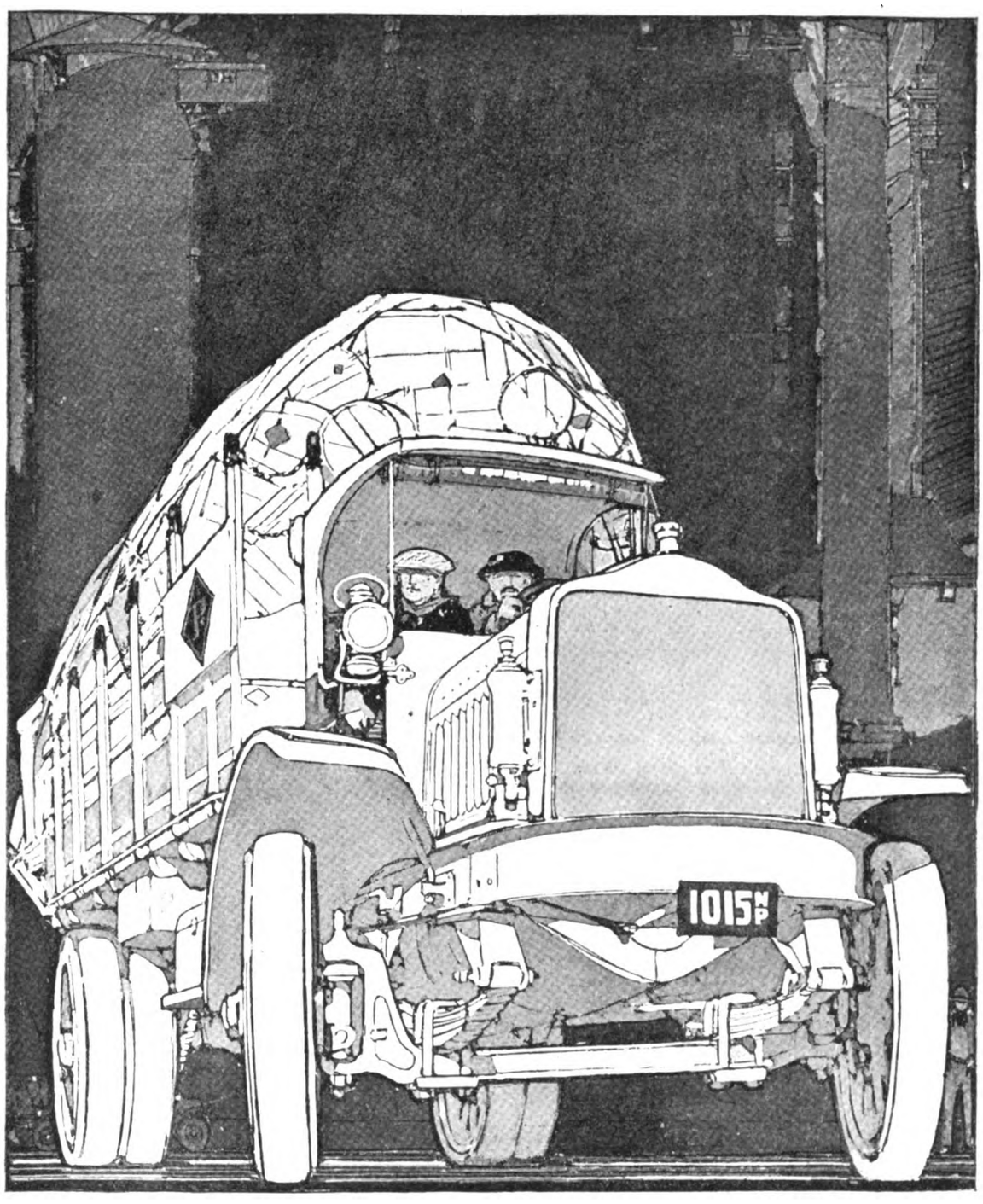
Bermuda's Motor Bus Line, which it was thought would soon go into operation following the passage of an act repealing the present law prohibiting the use of mechanically-propelled vehicles of all sorts in that island, as reported in THE COMMERCIAL VEHICLE of Aug. 15, 1916, has fallen through. The legislature defeated the bill by which the line could be established by a vote of fifteen to fourteen. It was intended to establish lines between Hamilton and St. George and between Hamilton and Sommerset.

"Brick Roads," is the title of a booklet recently issued by the Office of Public Roads and Rural Engineering, U. S. Department of Agriculture. The principal advantages which brick roads possess, according to the booklet, are that they are more durable than other types under practically all traffic conditions; that they afford easy traction and moderately good footholds for horses, and that they are easily maintained and kept clean. The principal disadvantage of the brick road is its high first cost. The defects which frequently result from lack of uniformity in the quality of the brick or from poor construction are usually to be traced indirectly to an effort to reduce the original cost or to a popular feeling that local material should be used even when of inferior quality. The booklet states the first brick pavement constructed in this country was laid down in Charleston, W. Va., in 1872. The purpose of the new bulletin is to make clear certain important essentials in the choosing of brick for a pavement and in laying it so that the highway so covered will endure. The bulletin contains forty pages, which, besides taking up the selection of brick and the methods of testing it, gives detailed descriptions and diagrams showing the proper methods of construction of brick roads, including the preparation of the road bed, the construction of the foundation base, the laying of the brick, the construction of curbing, expansion cushions and the final finishing of the pavement. There is also a chapter on the cost of brick pavement. Special emphasis is laid on the maintenance of such roads and the need for proper engineering supervision in their construction. An appendix is devoted to a series of typical specifications for constructing brick roads. The booklet should prove of much value to road engineers, supervisors and others contemplating the construction of brick roads. It can be obtained without charge from the Department of Agriculture, Office of Information, Washington, D. C., as long as the department's supply lasts.

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Saltsburg, Pa.	Kisselkar	Serene & Kelly
St. Joseph, Mich.	Kisselkar	Armstrong Auto Co.
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Bottom insert shows view of the new U. S. Ball Bearing Company factory.
Interior view shows a portion of the lathe department.

U. S.
BALL BEARINGS

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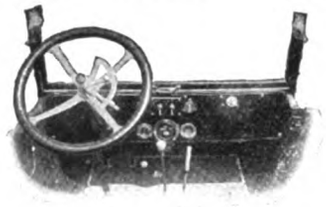
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The simple, POWERFUL, yet economical Studebaker motor — develops as much power as the usual ton or two-ton utility truck.

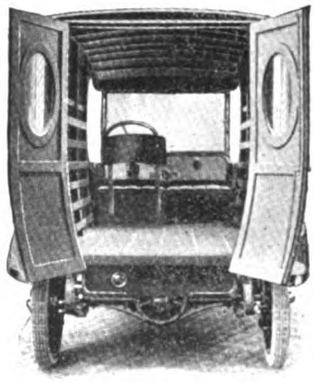
Big, ample-size Studebaker brakes.



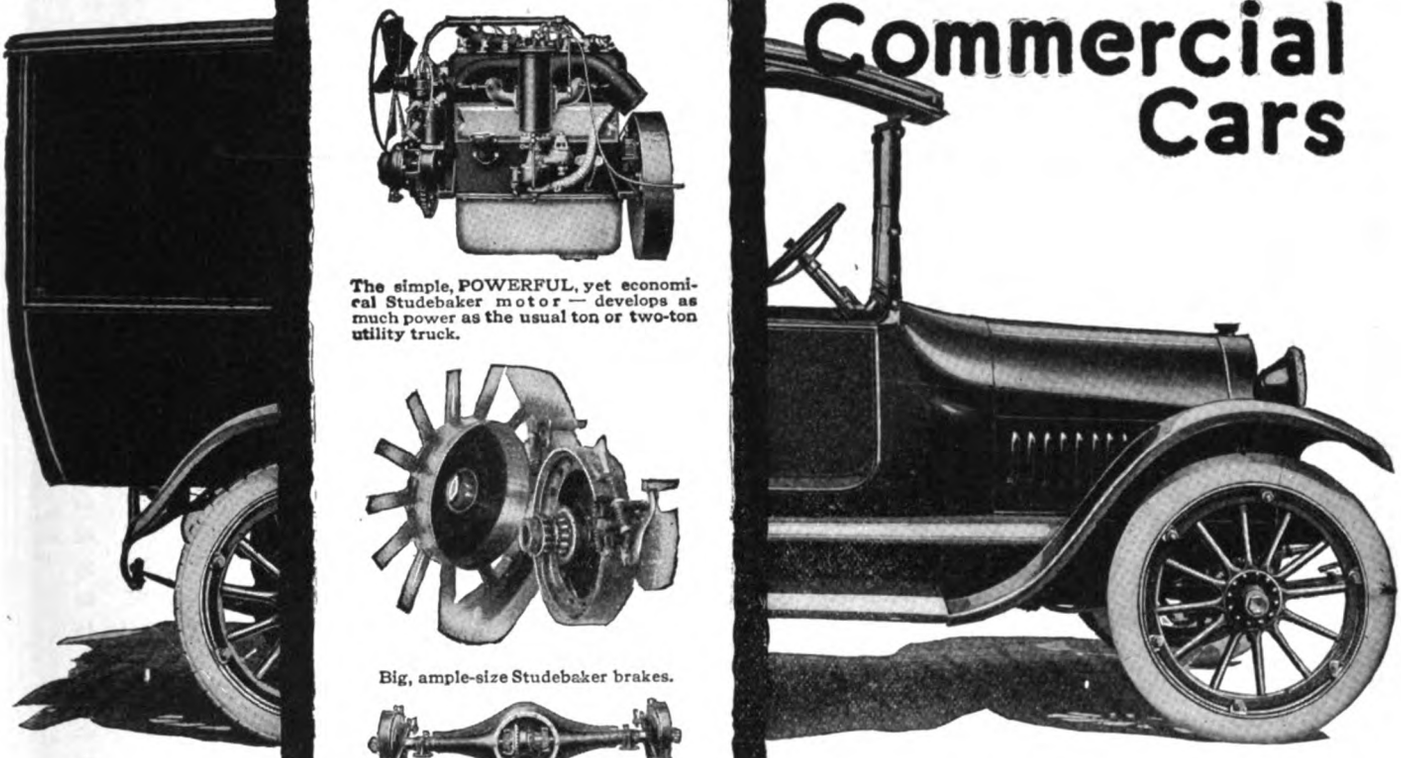
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Showing the roominess and loading space in the car—one of the results of Studebaker's long experience in producing high-grade delivery vehicles.



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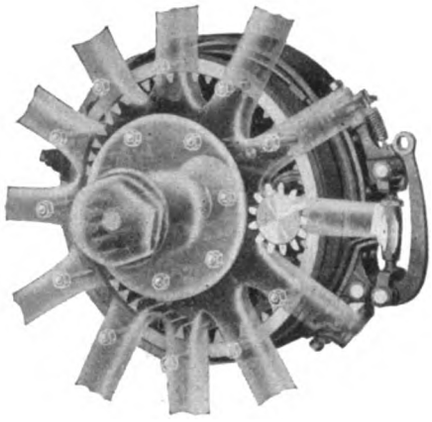
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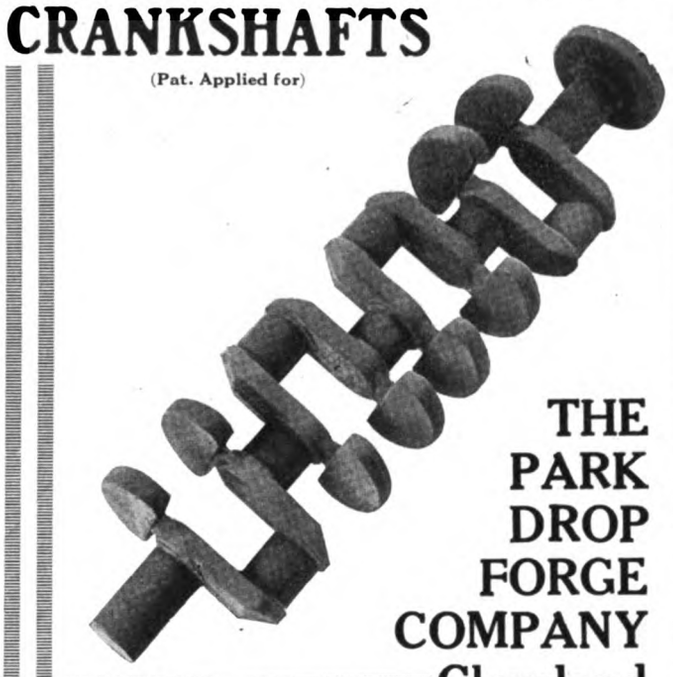
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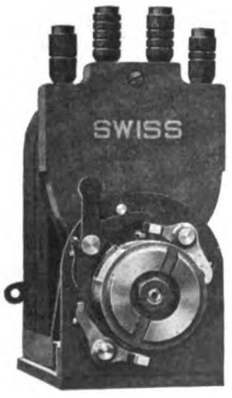
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The SWISS MAGNETO

That Costs the Manufacturer More
And Saves you hundreds of dollars, because it gives the *Hottest Spark, the Most Accurate Timing* and the *Only Perfectly Reliable Ignition Under all Conditions.*
The Swiss has stood 100% *perfect* under the most severe, prolonged and varied tests by impartial boards of engineers. No magneto built approaches it in scientific principle or mechanical fineness.
To start *sure*, and without danger of back kick, use only the Swiss Safety Starting Coupling. Exclusive on the Swiss Magneto.
Write today for Bulletin No. 2-C.

Swiss Magneto Co., 208 S. La Salle St., Chicago



Truck Tire Efficiency

Our new, secret process compound, vulcanized under a pressure of 1,600,000 pounds (almost four times the pressure used to vulcanize ordinary truck tires) has more vitality, rugged strength and durability than any other compound manufactured.

For this reason, United States Solid Truck Tires are the strongest and most durable now on the market.

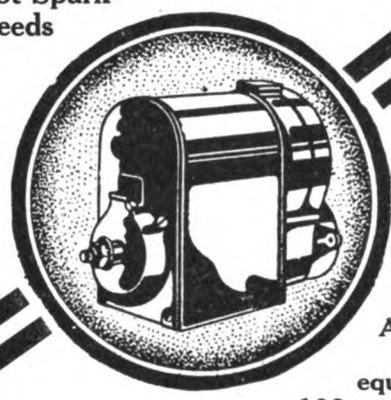
United States Tire Company
1790 Broadway, New York City

UNITED STATES RUBBER COMPANY AND ASSOCIATED COMPANIES — US RUBBER SYSTEM

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EISEMANN
MAGNETOS

A Sure, Hot Spark
at ALL Speeds



Adopted as
standard
equipment by
108 manufacturers

THE EISEMANN MAGNETO CO.

Sales and General Offices:
32-33rd Street, Brooklyn, N. Y.

Indianapolis, Ind., 415-417 N. Capitol Ave.
Detroit, Mich., 802 Woodward Ave.

GMC
GENERAL MOTORS COMPANY
TRUCKS

This trade mark stands for a complete line of trucks *built in worm and chain drive* to meet the varied demands of city and country work—a truck to fit your business.

Send for catalogues today

GENERAL MOTORS TRUCK COMPANY
One of the Units of General Motors Co.
Pontiac, Michigan

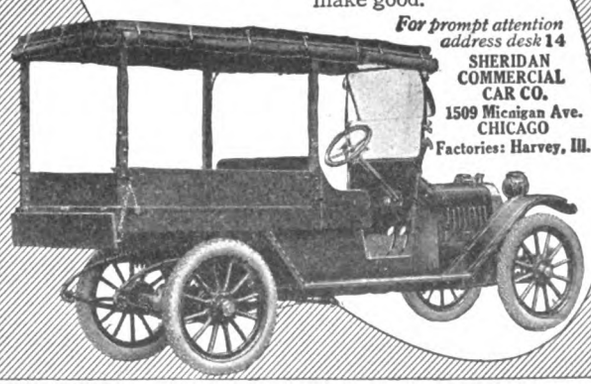
Branches and Distributors in principal cities (84)

1000 Pound Capacity
Sheridan Commercial Car
Ready for Delivery Now
Fully Equipped Price $540

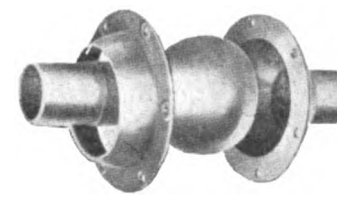
THE SHERIDAN is the lowest priced delivery car on the market. Thoroughly equipped and properly built to do the work it's designed for—haul 1000 pounds any time—anywhere. Ample in size, load capacity and power.

Sells fast to a big, ready-made field of *buyers*. Not a rebuilt pleasure car. Made a truck through and through by manufacturers of trucks, to replace horses where price is what counts. Chassis alone, $490. Fully equipped, $540. Write or wire for complete details. Make territorial reservations now. Dealers make good.

For prompt attention address desk 14
SHERIDAN COMMERCIAL CAR CO.
1509 Michigan Ave.
CHICAGO
Factories: Harvey, Ill.



BOSSERT



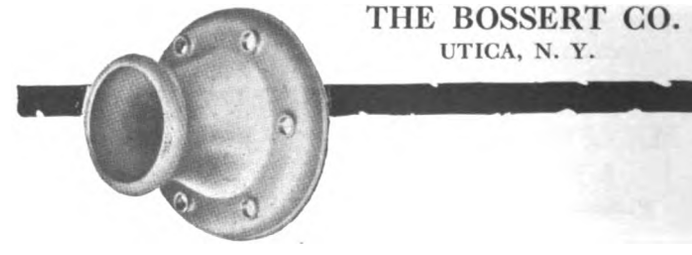
In the most perfect plant that brains, money and experience could devise, we have the men and equipment to produce pressed steel parts in any quantity on comparatively short notice.

We make more than 200 pressed steel parts and you can make your vehicles lighter and at lower cost, without sacrificing strength if you use **pressed steel** spring hangers, running boards, brake drums, etc., instead of malleable iron, steel castings and drop forgings.

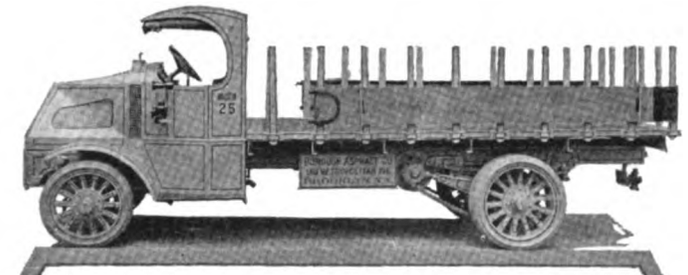
"THE BOSSERT WAY"

stands for the prompt delivery of your order filled in accordance with every item of the specifications.

THE BOSSERT CO.
UTICA, N. Y.



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NEW *Mack* MODEL

The Mack "AC," illustrated above, is the latest addition to our extensive line of motor trucks.

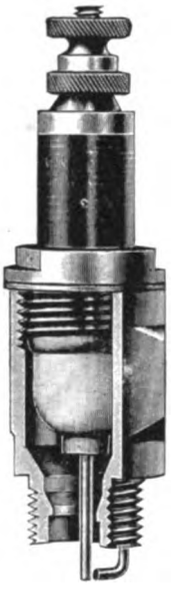
The demand for this model has been so instantaneous and consistent that we have been unable to supply demonstration trucks for all of our representatives. Despite this fact, our salesmen have had no difficulty in taking *new* orders and *repeat* orders from specifications and blue-print drawings.

Doesn't this satisfactorily demonstrate Mack superiority?

International Motor Company
64th St. and West End Avenue, New York

SOOTLESS
SPARK PLUGS

THIS PLUG increases the protection on the engine end of the plug by adding a porcelain cap so arranged and enclosed that it is protected against breakage, and yet gives plenty of air space between the porcelain (within the firing chamber) and the outer brass shell—this renders the chance of short circuiting through carbon formation exceedingly remote. The plug is so constructed that the high pressure due to compression tends to tighten rather than to loosen it. Being practically oil and soot proof, it is especially adapted for use in air cooled engines that use a large amount of lubricating oil.



Specials for Ford, Buick, Overland.
Write for Circular

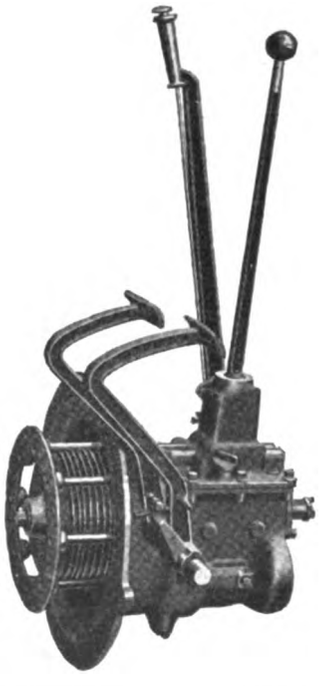
Manufactured by
The Oakes & Dow Company 17 CHARDON STREET BOSTON, MASS.

FULLER
Unit Power TRANSMISSIONS

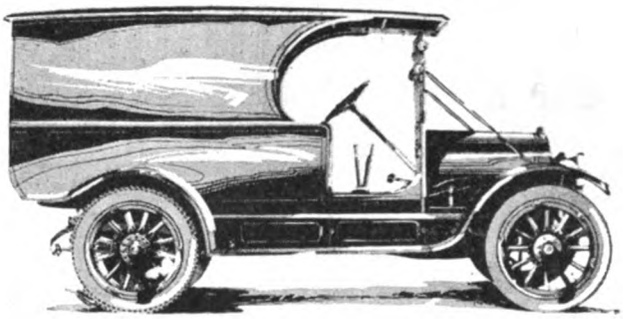
Model "T U" ¾-1 Ton

Model "T U 2" 1½-2 Ton 4 Sizes

Particulars sent on request



FULLER & SONS MFG. CO.
Kalamazoo, Mich.



Overland DELIVERY CARS

You Can Now Get This Big 35 Horsepower Panel Delivery Car For

MODEL 83 B

$695

f. o. b. Toledo

Catalog on request. Please address department 191

The Willys-Overland Co. Toledo, Ohio

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"Little Giant"

The Truck for All America



—for eight long years Little Giants have proved themselves—their big efficiency—solid service—real economy. They are backed by every dollar of the more than $11,000,000 capital and resources of Chicago Pneumatic Tool Company—a twenty-two-year-old concern with 25,000 active customers—eight great factories in this country and abroad—branch houses, agencies and service stations almost everywhere.

Write for Booklet—Mailed on Request

"Making Deliveries Deliver Profits"

Dealers:—Write for interesting proposition

CHICAGO PNEUMATIC TOOL COMPANY

Dept. P., 1615 Michigan Ave., Chicago
239 West 50th St., New York

THE LITTLE GIANT LINE

Model 15—1-ton Worm Drive, Chassis Price.....$1500
Model H—1-ton Chain Drive, Chassis Price.....$1400
Model H—1½-ton Chain Drive. Chassis Price.....$1500
Model 16—2-ton Worm Drive, Chassis Price.....$2500

NORTH AMERICAN MOTORS

4-⅝ in. x 6 in.—45 H. P.—1200 R. P. M.

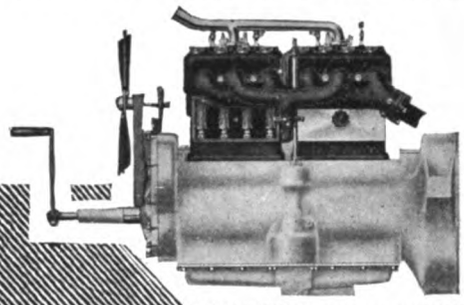
Expressly Designed to Take Care of the Most Exacting Conditions in Truck Service

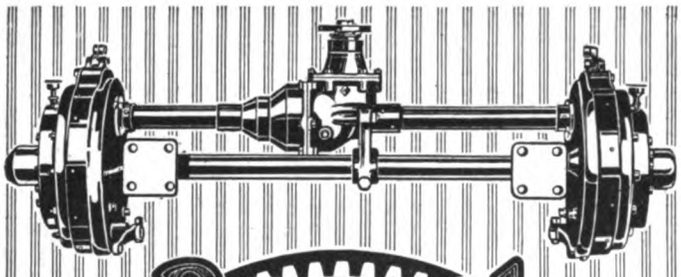
Model N is a Long-Stroke Motor with a Tenacious Pulling Power—the very essential demanded by successful builders of motor trucks.

Rich with such features as Timing Shaft driven by Silent Chain, Speed Governor, Valves all on one side, enclosed and easily accessible by removable plates, and intake and exhaust manifolds on one side, with magneto on opposite side, removed from heat of exhaust manifold.

There are other good reasons why you should use the North American Motor. Let us tell you about them and quote prices.

North American Motor Co., Pottstown, Pa.





Russel

Internal Gear Drive Axles

SELLING trucks these days is not difficult, for the industries of the country are awakening to the advantages of motorized delivery.

Make your sales even easier by using trucks driven by the Russel Internal Gear Drive Axle.

Industrial preparedness demands that the most serviceable, durable and efficient form of truck haulage be adopted by you.

Adopt, therefore, a truck using The Russel Internal Gear Drive Axle

Russel Motor Axle Co., North Detroit

Standard

MADE IN DETROIT USA

Motor Trucks

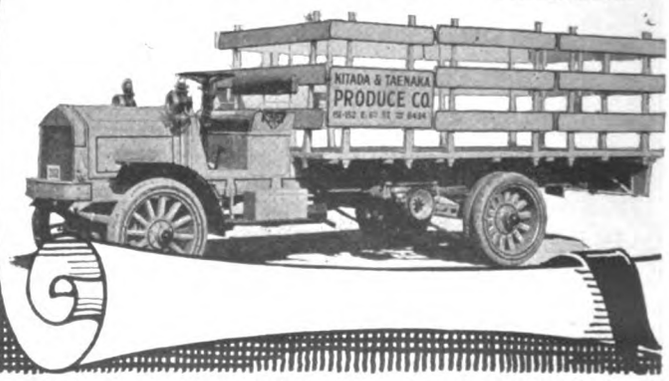
Startled the Motor Truck Industry By a Unique Sales Plan

First of all, the Standard is an unusual truck. It is a powerful combination of many of the world's best-known units—the Continental Motor; Timken Axles; Timken Bearings; Brown-Lipe Gears, and other well-known standard parts.

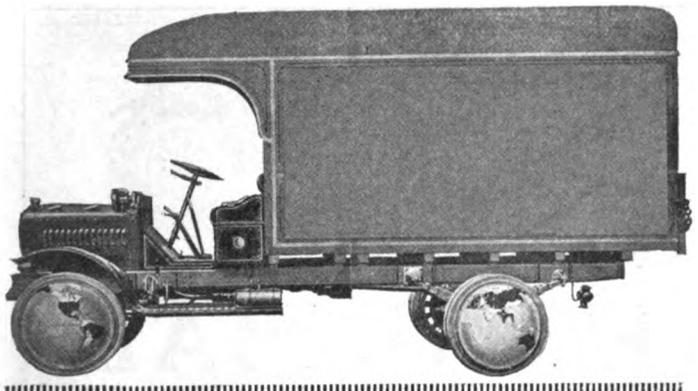
The Standard Motor Truck is sold in an unusual way. Any responsible person can be the agent for the Standard, with absolutely *no investment—no deposit* and *no contract.*

Write for details of this plan. ***No obligation.***

STANDARD MOTOR TRUCK CO., 315-327 Bellevue Ave. Detroit, Mich.



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WICHITA TRUCKS

Dependability Plus Extensive Service

ARE YOU THE DEALER

who can put into your salesmanship WICHITA Energy and Spirit and back up your selling accomplishments with WICHITA Service?

If you are such a dealer, we have an interesting selling plan that you will not want to miss considering.

The faithful co-operation of our factory organization will give you encouraging help.

We want live dealers NOW—Men who will interest concerns in our heavy-duty trucks, and then to not let up on them until they sell them.

Request us to immediately submit our plans.

WICHITA FALLS MOTOR COMPANY
Arthur Boulevard, Wichita Falls, Texas

Coal-Haulers

throughout the United States will welcome the news of this new invention in elevating bodies.

If you are thinking of increasing your fleet now or soon, please note that it is possible for you to order one or more of them at once, through your local dealer, regardless of the make of chassis you select.

Fits Any Truck



These bodies are built in all capacities, are equipped with power drive, and are safety locked during elevation. However, get the full facts, prices, etc., by writing in for descriptive bulletin No. 5. Do this now.

For the special information of dealers, we will be glad to supply further details.

The Lally Commercial Body Co.
EVERETT MASS.

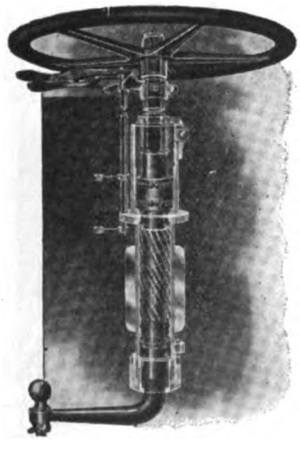
STANDARD

on good motor truck construction

INVESTIGATE



Fore and Aft Steering Gears



Cross Type

Enormous bearing surfaces

Perfect Lubrication

Best material thruout

Finest workmanship

Ross Gear & Tool Co.
790 Heath Street
Lafayette Indiana

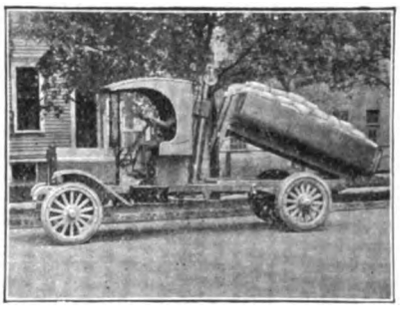
Stegeman

SIX-CYLINDER

SELF-STARTER

WORM-DRIVE

TRUCKS



The most for your money—that's what we offer. A 6-cylinder Motor, Electric-Starter and Electric-Lights are furnished on our truck without extra charge. On any other machine they would cost $300 extra.

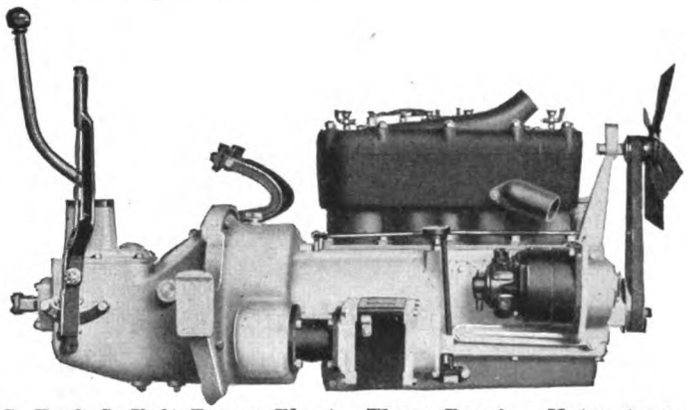
Ours is not the cheapest truck on the market, but it is certainly a low-priced line, quality considered.

WE WANT RELIABLE AGENTS

STEGEMAN MOTOR CAR CO.
Milwaukee, Wisconsin

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G·B&S motors



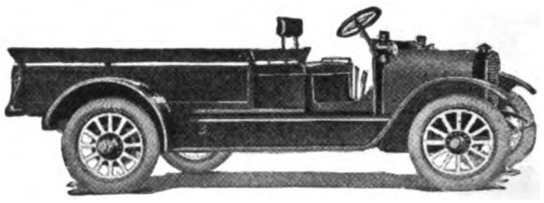
G. B. & S. Unit Power Plant. Three Bearing Motor (unusually large heavy bearings) 3¾ x 4¼, developing 22½ H.P. A. L. A. M. or 36.9 H.P. brake test.

IF you want a four-cylinder unit power plant that will absolutely satisfy, get in touch with us.

You will find that our **one** model policy permits quotations just as attractive as our deliveries —and we are always in shape to "jump production."

Blue prints and full details on request.

GOLDEN, BELKNAP & SWARTZ COMPANY
DETROIT, MICHIGAN



We Build 33 Types of
HANNIBAL
Commercial Bodies

A body for Ford chassis and for heavier types of trucks.

We make a standard body for Smith-Form-a-Truck.

Over 50 years' experience and unsurpassed manufacturing facilities enable us to build exceptionally well.

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HANNIBAL MOTOR WAGON & BODY CO.
HANNIBAL, MISSOURI

The Star Union Brewing Co., of Peru, Ill., is duplicating—

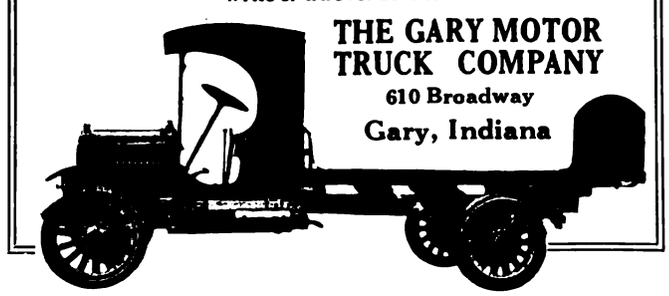
The Worm Drive
GARY TRUCK

—now on duty in Peru, for its Peoria branch.

It's the same story we've had to tell ever since GARY Trucks first became established in the field—50% of our business is repeat orders from GARY owners—the best recommendation for Gary service.
Every refinement known to increase efficiency is incorporated in the GARY Truck, by expert workmen.
The result is 4 GARY models, 4 capacities at 4 prices that are right—ready to handle any load you want to move—and to give satisfaction that will make you come back for more.
Try one GARY in service with any assortment of best known trucks. Your fleet will eventually be a GARY fleet.
Dealers—Reorders and generous new business make GARY the logical truck for dealers.

Write or wire for details

THE GARY MOTOR TRUCK COMPANY
610 Broadway
Gary, Indiana





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Throughout the United States

the unprecedented increase in all kinds of business has confronted merchants with delivery problems which must be solved. Their delivery zones must be enlarged and delivery efficiency and delivery economy must go together.

The answer to the problem is the

Commerce Truck

THIS CHASSIS OF 1500 LBS. CAPACITY with standardized component parts meets the gasoline situation fairly by giving the greatest mileage per gallon of any commercial vehicle of equal capacity. The first cost is low and the upkeep expense is very little, owing to the simplicity and quality of material and workmanship.

To truck dealers this line offers exceptional opportunities for large sales at this period of big business. Those who own Commerce Trucks will buy more and many who have relied on horse-drawn vehicles will now be in the market for motor trucks.

DEALERS send today for our proposition. Get specifications of our chassis and line of bodies. There's a big field for you. The time to coin money and build up your business is now—the vehicle to do it with is the Commerce Truck.

Commerce Motor Car Co., Detroit, Mich.

W. H. BRINKERHOFF, Eastern Representative
12 Belmont Ave., Elmhurst, Long Island, New York

Under Control

Jail should await the truck owner who does not know that the linings of his brakes are in perfect condition.

A heavy truck with bad brakes is a lawless menace.

Thermoid
HYDRAULIC COMPRESSED
Brake Lining - 100%

100% because it's brake lining clear through, not merely on the surface. It will hold though worn paper thin.

Thermoid is cured under hydraulic pressure into a solid substance of uniform density. It is the best brake lining you can buy.

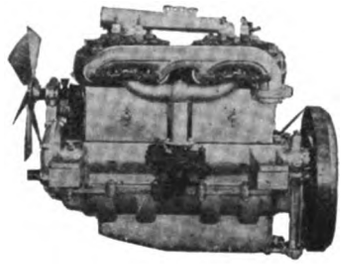
Write for facts and samples.

Thermoid Rubber Co.
Trenton, N. J.

Our Guarantee: THERMOID will make good or we will.

Cannot be burned out nor affected by oil, heat, water, gasoline, dirt.





Beaver Motors Make Their Way By The Way They Are Made

BEAVER MOTORS are made by truck motor specialists. The concentrated experience of engineers of international reputation is embodied in their construction.

BEAVER TRUCK MOTORS are made by men who make nothing but motors—who, by doing the same thing over and over have become masters in perfection. That is why we can make truck motors better, quicker, and at less cost than the truck manufacturer himself.

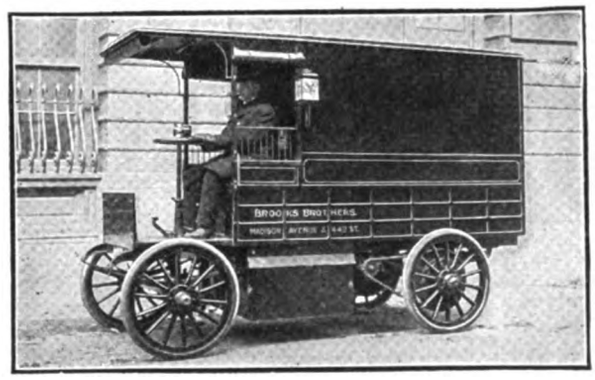
We make truck motors of all sizes, for all requirements. No matter whether you are building a 1,500 pound light delivery wagon or a 5-ton truck, we can meet your demands for power, economy and dependability.

Do not determine on a motor for your truck till you have sent us your specifications.

BEAVER MFG. COMPANY
Milwaukee Wisconsin

G. V. ELECTRIC TRUCKS

SIX MODELS: 1,000 POUNDS TO 5 TONS



Nearly 5,000 in use
Catalog on request

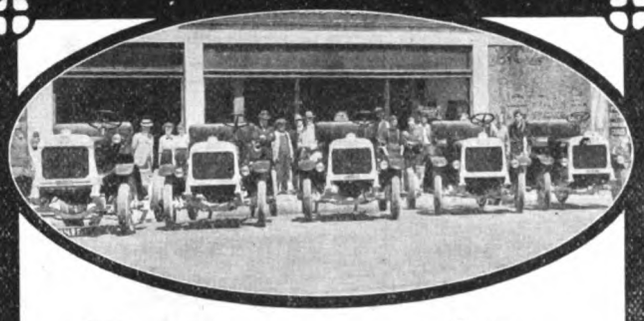
General Vehicle Company, Inc.

GENERAL OFFICE AND FACTORY
LONG ISLAND CITY, NEW YORK

NEW YORK::CHICAGO::BOSTON::PHILADELPHIA

1864

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Prosperity

is written down in advance for Gramm-Bernstein Truck dealers. They are always the big men in the field. Why? Because they represent the best truck made—the handiwork of B. A. Gramm, pioneer of the industry—and because their line is complete from one ton to six ton—a truck for every line of business, at a fair price. We want to start more dealers along prosperity's road. How about you? Write us for our special proposition to dealers.

GRAMM-BERNSTEIN CO., LIMA, OHIO, U.S.A.

THE GRAMM-BERNSTEIN COMPANY—LIMA-OHIO-U. S. A.

GRAMM BERNSTEIN

MANUFACTURERS OF HIGH GRADE WORM DRIVE MOTOR TRUCKS — 1-1½-2-2½-3½-5-6 TONS

—Sheldon Springs—

Designing a truck presents no nicer problem than that of providing it with springs.

No concern in the world is as well prepared to solve this problem—none with the amount of experience—none with the varied experience—none with the facilities and equipment, either human or mechanical, that the Sheldon Axle and Spring Co. offers.

Collectively—these facts are the reason why the service Sheldon Springs will give is a known quantity and a guaranteed quantity.

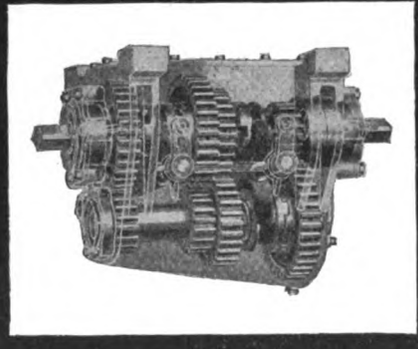
SHELDON AXLE AND SPRING COMPANY

Wilkes-Barre, Pa.

Makers of Springs and Axles for Heavy Duty Service for more than 50 years.

Chicago: 122 S. Michigan Blvd. San Francisco: 444 Market St.
Detroit: 1215 Woodward Ave.

COTTA TRANSMISSIONS

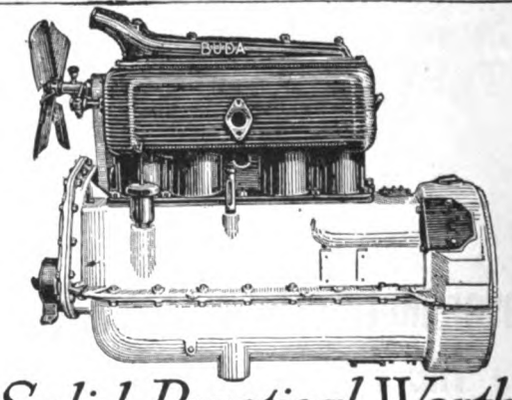


All Gears Always in Mesh

ROCKFORD

An Assurance of Dependable Service

The Cotta Transmission Co.
Rockford, Ill.



Solid, Practical Worth

in the highest possible degree is the goal successfully attained by the

BUDA TRUCK MOTOR

Truck value is practically determined by the efficiency and durability of the motor. The value of *your* trucks should be insured by the 35 years of manufacturing integrity which stands behind the Buda Motor.

The BUDA COMPANY
HARVEY CHICAGO SUBURB ILLINOIS

Models for all trucks.

THE BUDA COMPANY BUDA MOTOR "The part to buy the car by" ESTABLISHED 1881

Models for all cars, too.

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SELDEN TRUCKS

Dealers can afford to wait for our new announcement and attractive selling proposition.

A full line of Commercial Vehicles from a 1500 lb. Delivery Car to a 3½ ton Truck.

All Ready by September

SELDEN TRUCK SALES CO.
Rochester, N. Y.

PERFECT simplicity of operation is ONE reason for WOOD hoist supremacy. There are, very naturally, others.



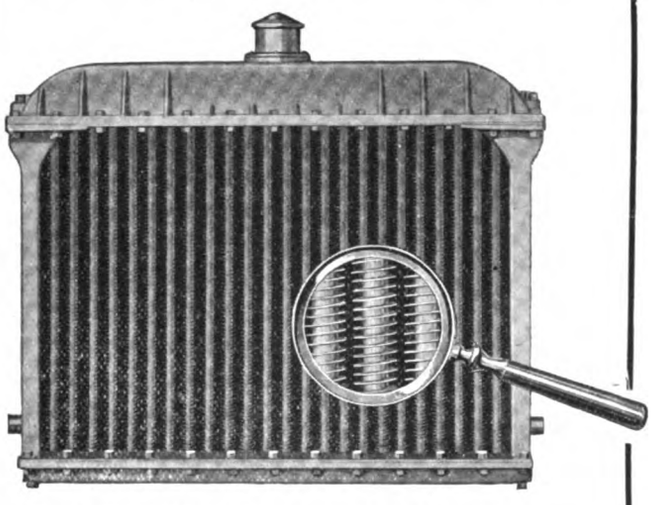
NINETY per cent. of the truck makers in this country list WOOD bodies as standard equipment — now ***why?***

Talk it over with your dealer today

WOOD HYDRAULIC HOIST AND BODY CO.
DETROIT

WOOD HOISTS WOOD BODIES

Seamless Copper Helical Tube Cooling Sections



Are Guaranteed for the Life of the Motor on Which They are Installed

Helical Tube Construction is Accepted as the Best by the Leading Truck Makers of America

Manufactured only by

ROME-TURNEY RADIATOR CO.
ROME, NEW YORK



The Truck of Big Sales-Power

The *fifteen famous features* of the ACME Truck are assembled on the strongest frame used in any truck on the market. They provide a *selling* combination that is irresistible to the purchaser—that brings ACME Dealers *the biggest business with least effort.*

Continental Motor	Timken Bearings	Eisemann Magneto
Timken Worm Drive	Warner Clutch	Rayfield Carburetor
Timken Front Axle	Warner Transmission	Gemmer Stearing Gear
Timken Rear Axle	Detroit Springs	Smith Pressed Steel Frame
	Long Radiator	Pierce Governor
		Stewart Vacuum System

ACME THE TRUCK OF PROVED UNITS

The ACME 2-ton Worm Drive Truck, chassis equipped, $2100 and the ACME 1-ton Worm Drive Truck at $1500 give you a complete line up to 3-ton requirements.

DEALERS!

Write for our territorial proposition and full particulars about ACME Trucks—also details of how this strongly financed company co-operates locally with an effective advertising and selling campaign.

Cadillac Auto Truck Company
16 Mitchell St., Cadillac, Michigan

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Wells Fargo makes sure of truck efficiency

Think of the money lost if the vast fleet of Wells Fargo trucks were run wastefully! Wells Fargo & Company know this, and each of their trucks is equipped with the

DREADNOUGHT *Indestructible* Hub Odometer

Whether you have one truck or a thousand, you can save money with the Dreadnought. It gives you unfailing mileage records. It stops the waste in engine, tires, oil, fuel, driver, etc. It's always working, always reliable.



The Dreadnought is guaranteed indestructible. If you break it we will replace it free. The figures are always legible—do not revolve—cannot be obscured by grease or dust.

RECORDOGRAF

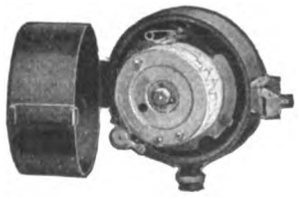
gives an accurate tape record of your truck throughout the day. Shows

Time truck is moving—

Time truck is still—

Distance traveled—

Speed at all times.



Write for booklets and prices of these instruments, and stop the leaks in your truck operation now.

AMERICAN TAXIMETER COMPANY

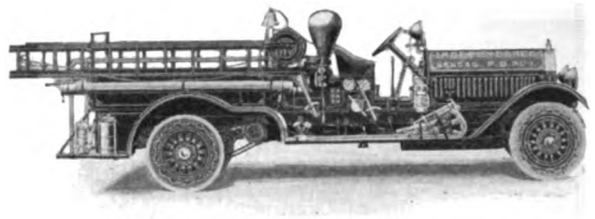
Mfrs. of Jones and Popp Taximeters

1765 Broadway, New York City

Service Stations also in the Following Cities:

Philadelphia Boston Pittsburgh St. Louis Washington Chicago Detroit Seattle San Francisco New Orleans

FIRE!



SOUTH BEND DOUBLE DUTY FIRE APPARATUS

Built for SERVICE

Reliability and Efficiency

SOUTH BEND MOTOR CAR WORKS
SOUTH BEND, IND.

New 1916 Edition of Questions and Answers

By Victor W. Page, M. E.

☐ **$1.50** ☐



☐ **$1.50** ☐

On Modern Automobile Design, Construction, Driving and Repair

Just off the press. A practical self-educator, consisting of 37 progressive lessons. Contains over 600 pages. Profusely illustrated with photographs and drawings of practical working parts. Includes all the 1916 developments.

Sent prepaid to any address on receipt of price.

Book Dept., The Commercial Vehicle
239 West 39th St., New York

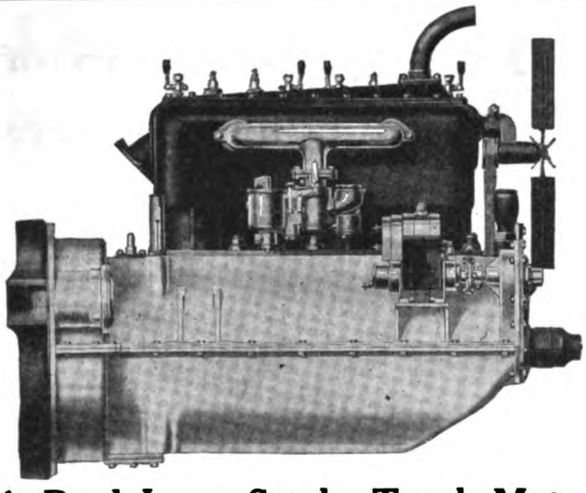
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M&S DIFFERENTIAL

THE success of the M & S on the Jeffery Quad and the overwhelming evidence of severest tests long since established "the differential that pulls both wheels" as the ideal one for commercial motor vehicles.

Write for interview or send in your specifications.

M & S GEAR COMPANY
166 Lycaste Street
DETROIT



A Real Long Stroke Truck Motor

Type T U, 4 x 6; Type U U, 4½ x 6; cylinders interchangeable. Crankshaft, four bearing, chrome nickel steel, 2 in. diameter. Bearings, bronze, Fahrig metal lined. Camshaft, one piece, cams integral. Oiling system, force feed, hollow crankshaft.

WRITE FOR COMPLETE SPECIFICATIONS.

WISCONSIN MOTOR MFG. COMPANY
Station A, Dept. 319 **MILWAUKEE, WIS.**

New York Branch: 50 Church Street. T. M. Fenner, Factory Representative. Pacific Coast Representative: Earl P. Cooper Co., 1428 Bush Street, San Francisco; 333 West Pico Street, Los Angeles.

Wisconsin CONSISTENT Motors

Lippard-Stewart — the Best Motor Truck in America

Sell Service— Not Trucks

Performance is the thing your customer demands, and you must have "performance" to sell him.

He is not interested in a motor truck for itself alone: he is interested in the service that truck can give.

He is not concerned over the price of the truck, but he is vitally concerned with the cost of delivery per package—or per mile.

The motor truck is only a means to an end, and that end is economical hauling.

There are many efficient trucks on the market today, but none promises better performance than the Lippard-Stewart;

—none can show lower cost per package delivered than the Lippard-Stewart;

—none can show a cleaner record in competitive tests than the Lippard-Stewart;

—none can compare with the Lippard-Stewart in low maintenance cost.

The Lippard-Stewart does not require service of the dealer; it **renders** service to its owner.

When you sell performance—not simply trucks—you must have the goods back of you. The Lippard-Stewart—the Best Motor Truck in America—backs up the dealer on every point—makes good on every promise.

Write for catalog and other literature.

Lippard-Stewart Motor Car Co.
233 West Utica St., Buffalo, N. Y.

½ TON, ¾ TON, 1 TON,
1½ TON AND 2 TON TRUCKS



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One Thousand Miles on High Gear

OVERLOADED 20 PER CENT.

Every hill on this route through Ohio and Michigan was taken on high without straining. Read the story in our booklet "The Wizard of Trucking." Only a Six and only a "Globe" could do it on 12½ miles per gallon of gas.



Six Cylinder Motor

trucks handle like a pleasure car. Start easier. On high 1½ miles to 25 miles per hour. 11 to 15 miles per gallon of gas. Quieter operation. Minimum motor vibration. Go anywhere, any roads, any time. Agencies being established rapidly. Write today.

MFG. BY

THE GLOBE MOTOR TRUCK CO.

NORTHVILLE, MICH.

DON'T

throw your old bearings away just because they are worn or broken.

We regrind the raceways (without drawing the temper) insert new balls and retainer AT about one-fifth the cost of a new bearing.

Any broken or worn bearing can be exchanged at any of our service stations, for reground bearings of any type or make, which are guaranteed equal to new.

These stations also carry complete stocks of New Single Row Annular, Thrust, NEW DOUBLE Row and Radax Bearings.

Write for Catalogue "U" and further information

Ahlberg Bearing Company

2636 Michigan Avenue Chicago, Ill.

BRANCHES

New York, 1790 Broadway — Cleveland, 1841 Euclid Ave.
Boston, 93 Massachusetts Ave. — St. Louis, 2831 Locust St.
Detroit, 790 Woodward Ave. — Los Angeles, 325 W. Pico St.
Minneapolis, 926 Marquette Ave.

PIERCE

Leading Manufacturers advertise, as proof of their leadership, the presence of PIERCE GOVERNORS on their trucks.

The

PIERCE GOVERNOR COMPANY

Anderson Indiana

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When others give way

GOODRICH DE LUXE TRUCK TIRES

Made in 5 in., 6 in. and 7 in. widths

prove their superior mileage and service-giving ability

—Ore from the richest magnesite mines in America are hauled by a fleet of motor trucks from the interior to the railroad at Livermore, Cal., a distance of 35 miles.

And on these trucks, Goodrich Tires form the major all-around equipment. It is because they *make records* for continuous, long wearing service under the most trying road conditions. Half of the distance is over rough mountain roads—very rutty, with sharp turns and steep grades.

—Some tires on this grueling run invariably give out after a few thousand miles. Some less than that. Goodrich DeLuxe give mileages of from 7,000 to 15,000 miles.

Write for Catalog

The B. F. Goodrich Company, Akron, Ohio

Makers of the Celebrated Goodrich Automobile Tires—*"Best in the Long Run"*

Service Stations and Branches in All Important Trucking Centers



One of the Packards hauling ore from the mines to Livermore. Goodrich Tires making good on these narrow mountain roads.



Goodrich front DeLuxe after 15,000 miles of grueling service. 6-ton Riker truck of C. H. Congdon, Jr., Livermore, Cal.

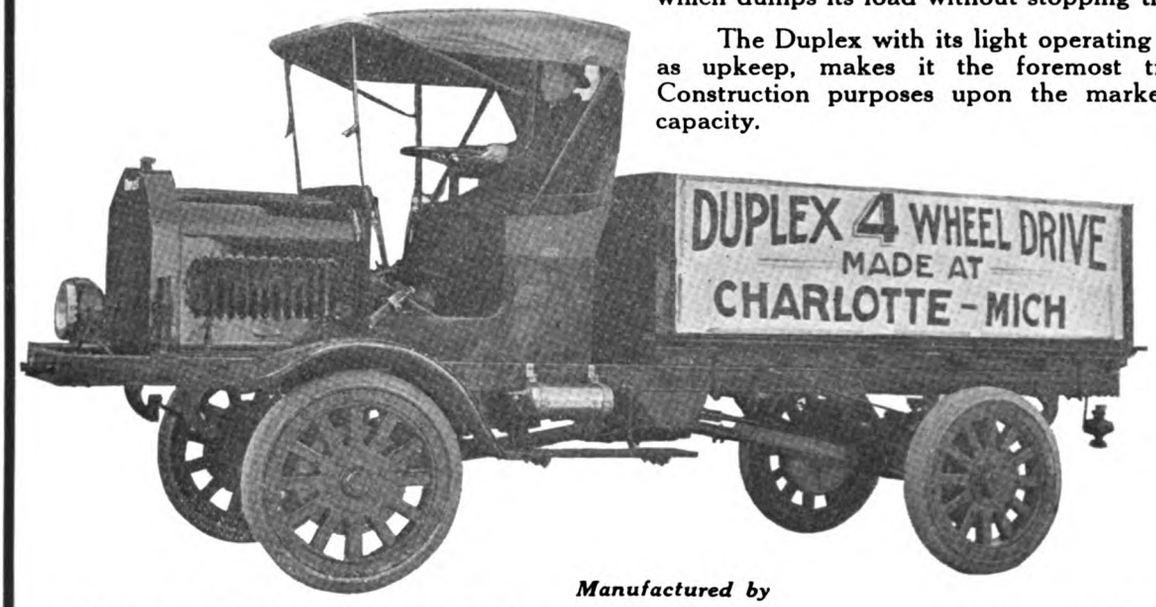
DUPLEX 4 WHEEL DRIVE

THE TRUCK OF EARNING EFFICIENCY

This cut represents the Duplex 4-Wheel Drive Road Truck, and is one of many others hauling one hundred and fourteen yards of gravel every twenty-four hours, a distance of 7.7 miles and at $1.00 per yard, earns $114.00 per day.

This truck with trailer has Duplex Side Dump Body which dumps its load without stopping the truck.

The Duplex with its light operating expense as well as upkeep, makes it the foremost truck for Road Construction purposes upon the market regardless of capacity.



Made in two-and three-ton capacity

Manufactured by

DUPLEX POWER CAR CO., Charlotte, Mich.

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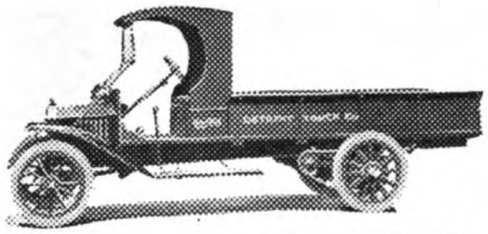


PLEASE MENTION THE COMMERCIAL VEHICLE WHEN WRITING TO ADVERTISERS

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Take care of More Business with the Same Upkeep

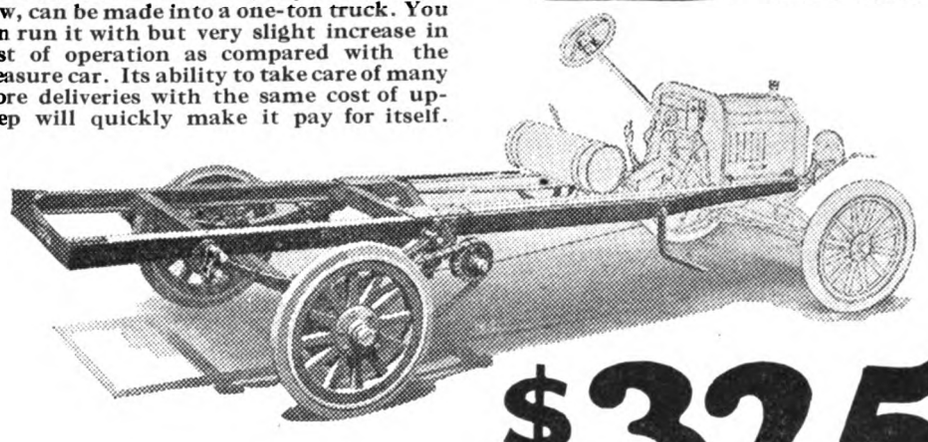
by making a 1 TON TRUCK of Your Ford



Tonford

TRADE MARK

With the TONFORD unit, any Ford, old or new, can be made into a one-ton truck. You can run it with but very slight increase in cost of operation as compared with the pleasure car. Its ability to take care of many more deliveries with the same cost of upkeep will quickly make it pay for itself.



$325

F. O. B. DETROIT

Drygoods merchants, wholesalers, laundries, etc., who have been in the habit of using three or four light Ford delivery cars are now taking care of more business with much lower operating cost by using one or two TONFORDS.

No matter what your delivery or transportation problems may be, consider the advisability of investing in a TONFORD before paying the greater initial cost, as well as the greater maintenance cost, of an ordinary one-ton truck.

The TONFORD unit fits on the frame of any Ford car, converting it into a one-ton truck with a 127-inch wheelbase and a loading space of from nine to eleven feet back of the driver's seat, and up to six feet wide, depending on the style of body.

The TONFORD sells for $325.00. You can now buy a new Ford Chassis for $325.00. The TONFORD truck unit is easily attached without changing the chassis in any way. Simply drill four holes and bolt the two frames together and you have a dependable one-ton truck with the Ford ease of control and economy of operation.

Dealers: We want representation everywhere. This is surely the "universal" truck. We are making prompt deliveries. Get in touch with us at once.

DETROIT TRUCK COMPANY, DETROIT, MICH.

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BROWN-LIPE



ONE of the most important developments that has been made in clutch construction is the method of driving as shown in the newest Brown-Lipe design illustrated below.

Previous construction called for the use of 12 driving keys riveted to the driving drum. These keys and rivets have been done away with in the new clutch.

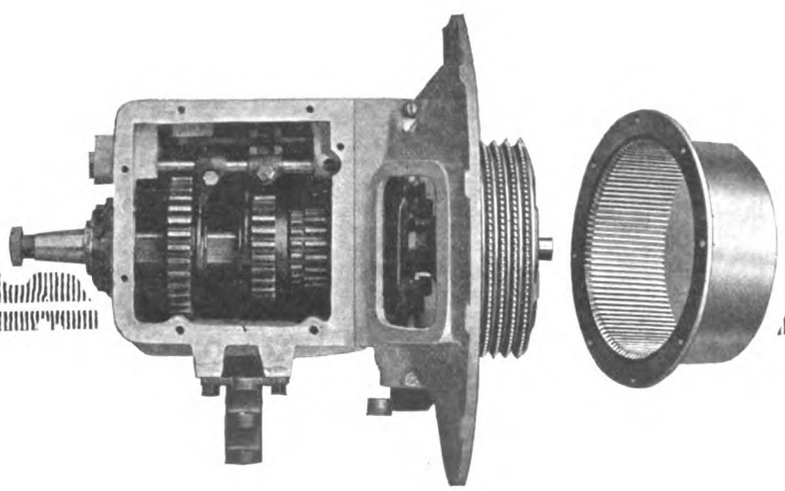
Instead, the outside edges of the clutch driving plates are machined so as to mesh with a series of gear teeth cut internally in the driving drum—as shown in the illustration herewith.

This not only makes for a more positive drive, but it is a more simple and substantial construction throughout.

BROWN-LIPE GEAR CO.
SYRACUSE, Transmissions N. Y.

New York, Thos. J. Wetzel, 29 West 42d St.
Chicago, K. Franklin Peterson, 122 S. Michigan Ave.
Detroit, L. D. Bolton, 2215 Dime Savings Bank Bldg.
San Francisco, A. H. Coates, 444 Market St.
Foreign Agent, Benjamin Whittaker,
2, Norfolk Street, Strand, London, W. C.

BROWN-LIPE-CHAPIN CO.
SYRACUSE, Differentials N. Y.



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On the job—always

The reason Signal Motor Trucks are "on the job"—always—is that they are designed and built for that purpose by men who know how to design and build for that purpose.

It is one thing to **say** you build your trucks that way; another thing to build them that way.

It is because we build Signal Trucks to "stay on the job" that we use such high quality constructional units as Continental Motors, Timken-David Brown Worm Drive rear axles, Brown-Lipe Transmissions, Ross Steering Gears, Eisemann Magnetos, etc.

Is is because we use such positively high grade construction that we are not afraid to say exactly what we mean.

It is possible to build cheaper trucks but it isn't possible to build any better trucks.

Moreover, what we say applies with equal force to our one-ton jobs and our five-ton jobs—and all the sizes in between.

Signal sales are growing. Signal reputation is spreading. Everybody says the Signal has the cleanest mechanism of any truck made. That fact helps the sales as much as it helps the service.

Dealers who are interested in both Sales and Service—and owners who are interested in Service more than Sales, find the clean-cut Signal chassis equally attractive.

Write for literature.

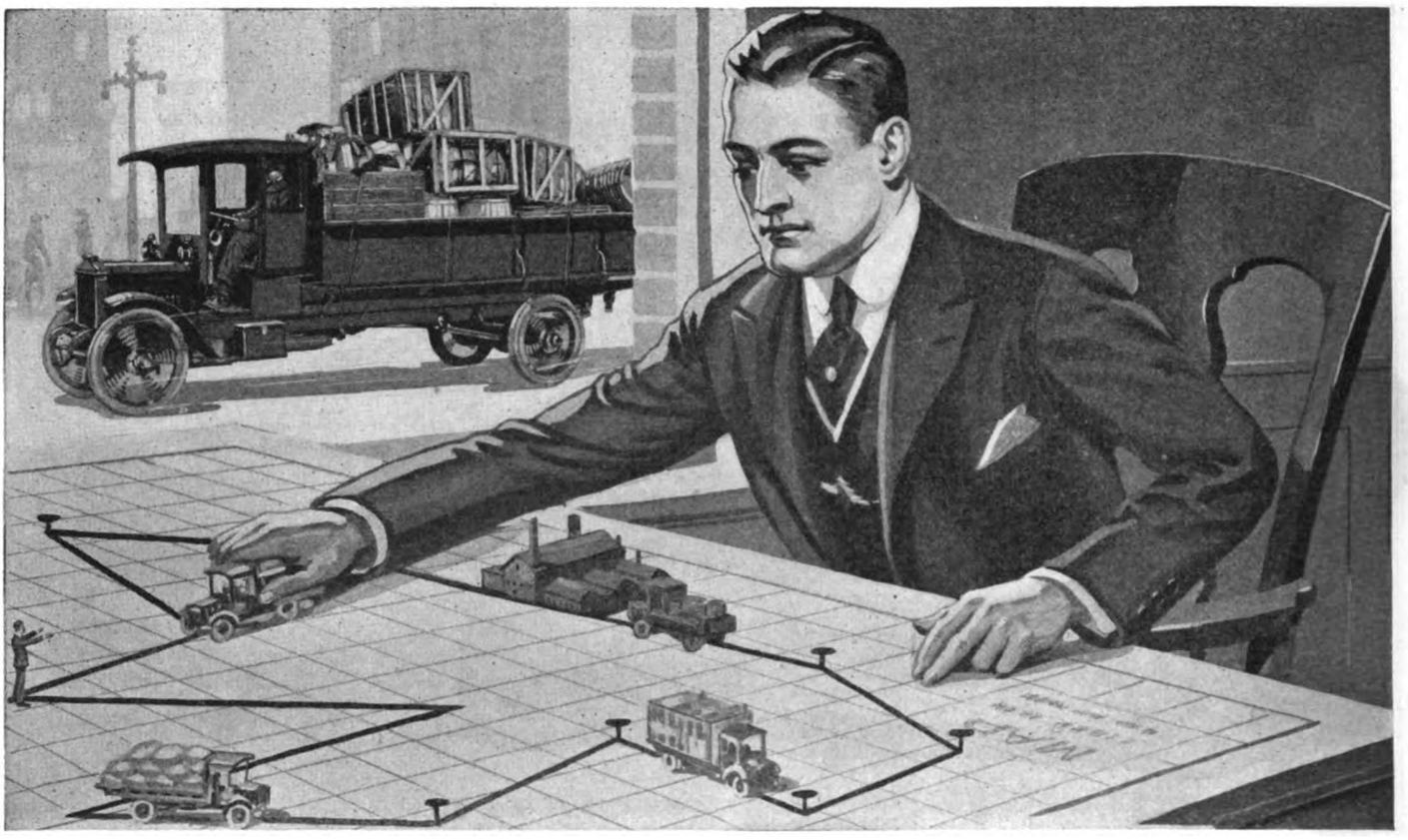
SIGNAL

Motor Truck Co.

DETROIT, MICHIGAN

SIGNAL 1-1½-2-3½-5 TON

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Reach out for New Customers

FEDERALize

Some firms close by you are struggling to keep up with deliveries.

Business is good—they could sell more if you could show them how to FEDERALize their haulage problem.

You can reach out with a couple of trips with a Federal—apply for them the routing idea and the sale is made.

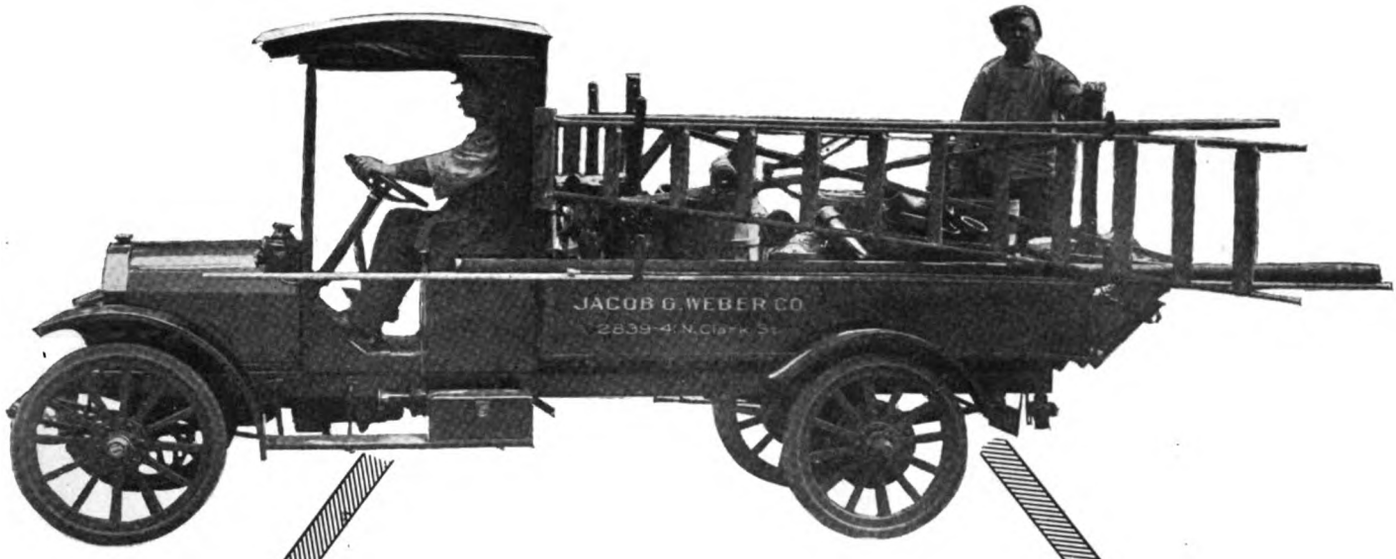
Impress on every prospect that there is no truck built better than the Federal—none that outwears a Federal in the same work.

Federal Traffic Department has instances of Federal Economy in every line of business. Ask for them.

The Federal Motor Truck Co.

DETROIT, MICH.

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The live concerns that are getting the big volume of paying business today are strong for SERVICE.

They use trucks as they use telephones —can't do business without them.

The most successful of them use DIAMOND T Trucks for good and sufficient reasons.

Write for Them

DIAMOND T MOTOR CAR COMPANY

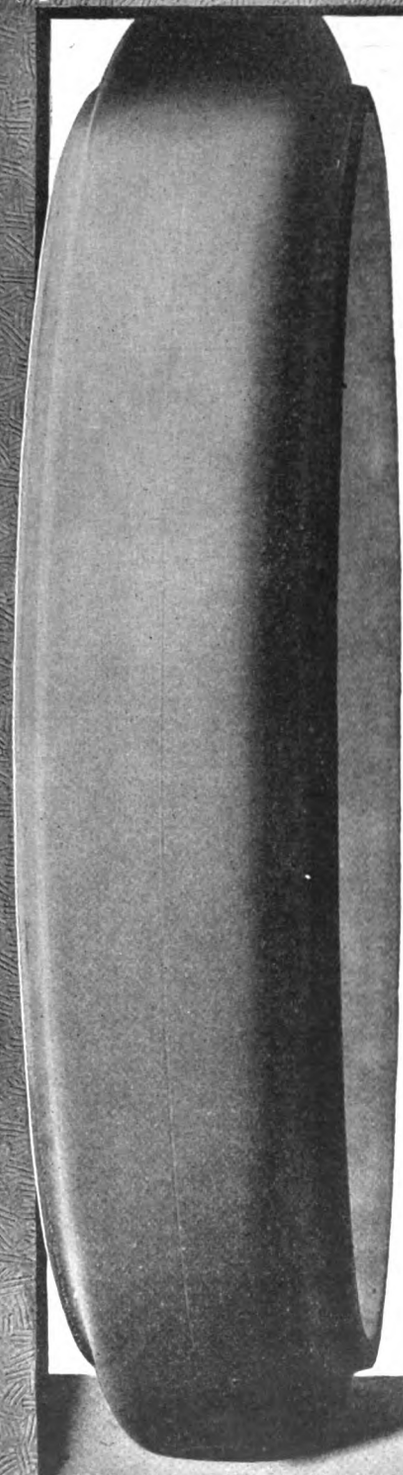
CHICAGO ILLINOIS

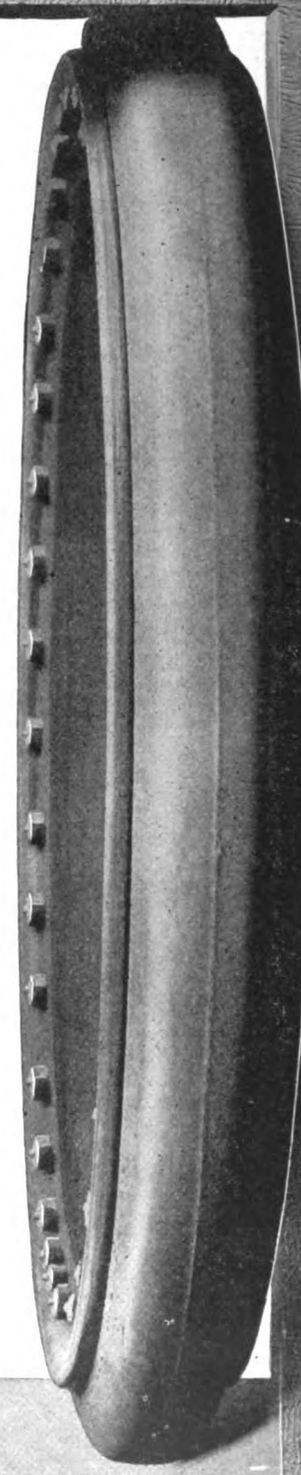
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Diamond T Motor Truck Co. of New York,
245 W. 55th St., New York City.
E. B. Olmsted, Buffalo, N. Y.
Pittsburg Saxon Co., Pittsburgh, Pa.
John H. Ryan, 495 Broadway, Milwaukee, Wis.
Brown Camp Hardware Co., Des Moines, Iowa.
Hudson Phillips Co., St. Louis, Mo.

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Firestone
TRUCK TIRES





There Is a Firestone for

More Economy —More Miles

in Your Truck Service

THOUGH there is a special Firestone tire to meet each particular need they have two qualities in common—extreme toughness, giving longest wear, and resiliency that insures protection to the truck mechanism. This is a Firestone success, so far unmatched. Proof is found in the preference given to Firestone tires by truck owners of the largest experience. Almost twice as many Firestone truck tires are in use as of any other one make.

Two of the many types of Firestone Tires are here shown—the Pressed-on type for heavy duty (on the left) and the Clincher Flange for I H C trucks (on the right).

The Firestone Truck Tire service is of very great advantage to every truck owner or prospective purchaser. In every large trucking center there is a Firestone Service Station with experts who will be glad to advise with you. This implies no obligation whatever. Call the station near you. Or write us for details and low prices.

Firestone Tire & Rubber Co.

"America's Largest Exclusive Tire and Rim Makers"

Akron, Ohio—Branches and Dealers Everywhere

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Krebs

"The Truck That Thinks"

IN presenting the new models of Krebs Trucks we direct the attention of truck owners, prospective truck owners and truck dealers to the fact that while we have refined our lines and conformed with the conventional ideas, we have not changed the structural essentials.

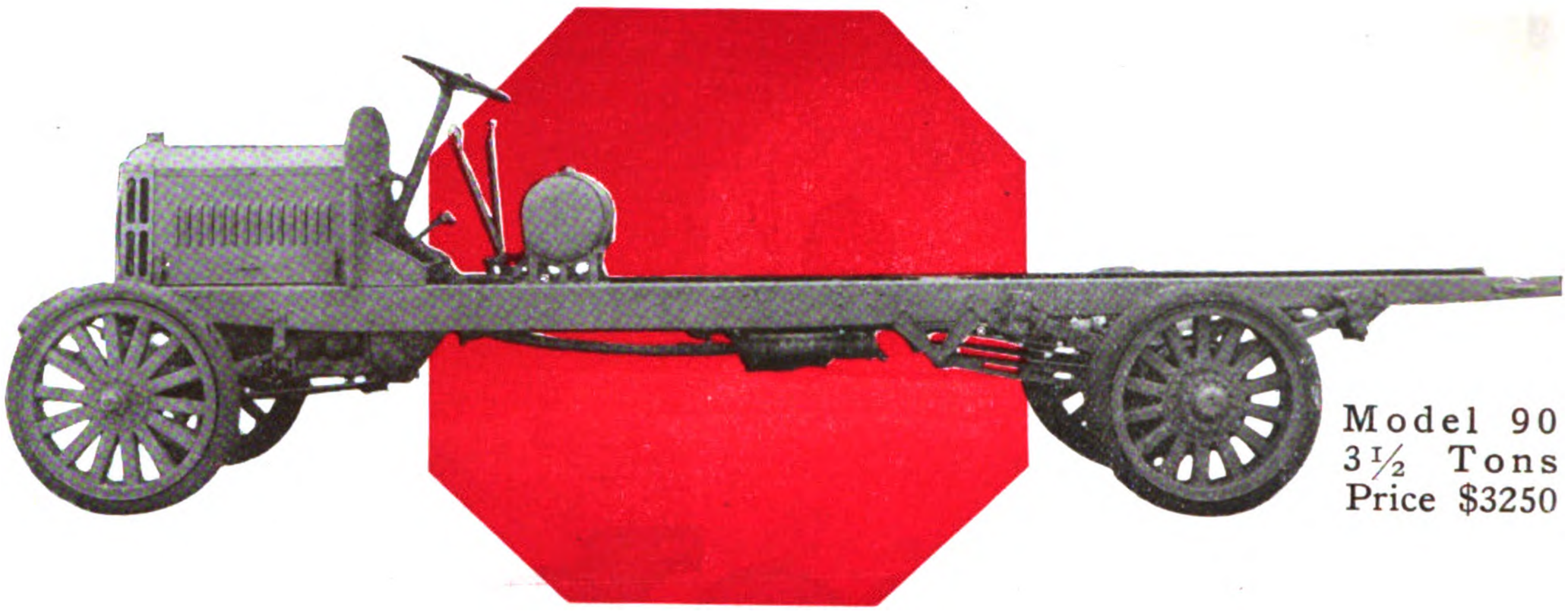
Krebs Trucks have won an enviable place in the field of commercial vehicles. In all parts of the country—in all kinds of service—they have demonstrated our claims for Simplicity—Low Maintenance Cost—High Efficiency and Dependability.

Our new models with their radiators of the vertical tube built-up pattern, with protecting armor, possess all the qualities for which Krebs Trucks are famous and possess them in greater degree than ever before. And the wonderful Krebs Governor, unchanged, is an integral part of every Krebs vehicle.

Before buying a truck—study the Krebs.

THE KREBS COMMERCIAL CAR CO.
CLYDE OHIO

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Model 90
3½ Tons
Price $3250

KREBS

Continental Motor

Brown-Lipe Clutch

Timken Axles

Bosch Ignition

The new models of Krebs Trucks are of very massive and rugged design. On the 3½-ton model, for example, the frame is of pressed steel one-quarter inch thick, eight inches deep and with flanges three and one-quarter inches wide, tapered at each end to give the greatest strength where needed, thoroughly braced and fastened with ½" rivets.

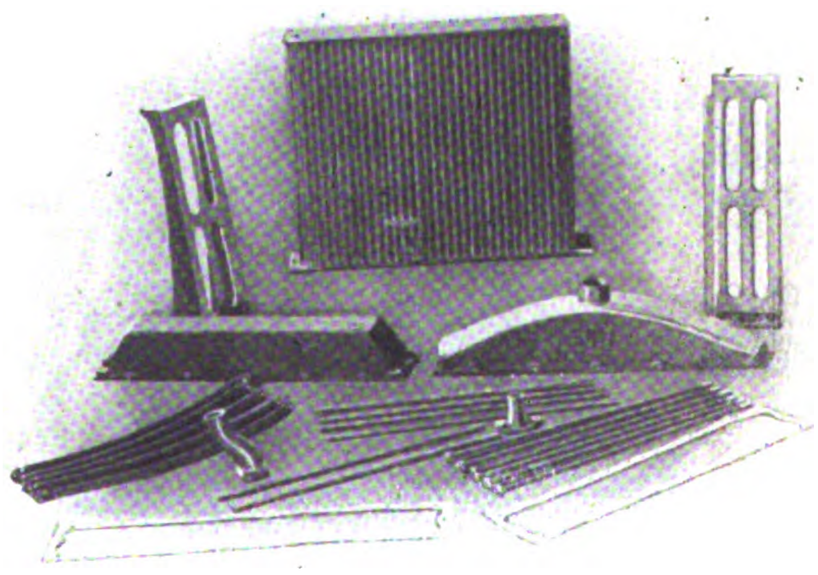
The rear spring bolts are 1½" in diameter by 3½" long and other wearing parts in proportion.

The radiator is built with 224 vertical copper tubes ⅜" in diameter and cast iron tanks, the whole firmly bolted together with vertical rods and held in position on the frame by coil springs.

On the two larger models the transmission is located midway between the clutch and rear axle. The front and rear propeller shafts with their universal joints are interchangeable. All motors and transmissions have three point support.

You cannot buy a more efficient truck at any price and you can pay much more for a truck which will not render the carefree, inexpensive service that characterizes

"The Truck That Thinks"



This illustration shows the new type Krebs radiator in its disassembled form. The outstanding feature of this radiator is the use of plain drawn copper tubes instead of the tubes of the finned variety. The front of the radiator is protected by strong iron bars.

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The famous Krebs Governor by which the Man-in-the-Office controls the Truck-on-the-Road. This governor is on all Krebs Trucks and is exclusive to our product. The story of its marvelous control is of vital interest to every truck owner. It simplifies operation and reduces every expense connected with operating a motor truck. A Krebs governed car can be driven by anyone; the driver does nothing but steer. There is no other governor which acts, operates and controls as does the Krebs.

Send for a description of the Krebs Governor, and what it does.



KREBS

"The Truck That Thinks"

We solicit your inquiries. We will gladly tell you what our product has done and is doing in actual service. Our references are as many as our customers and we will be glad to have you ask them about our product.

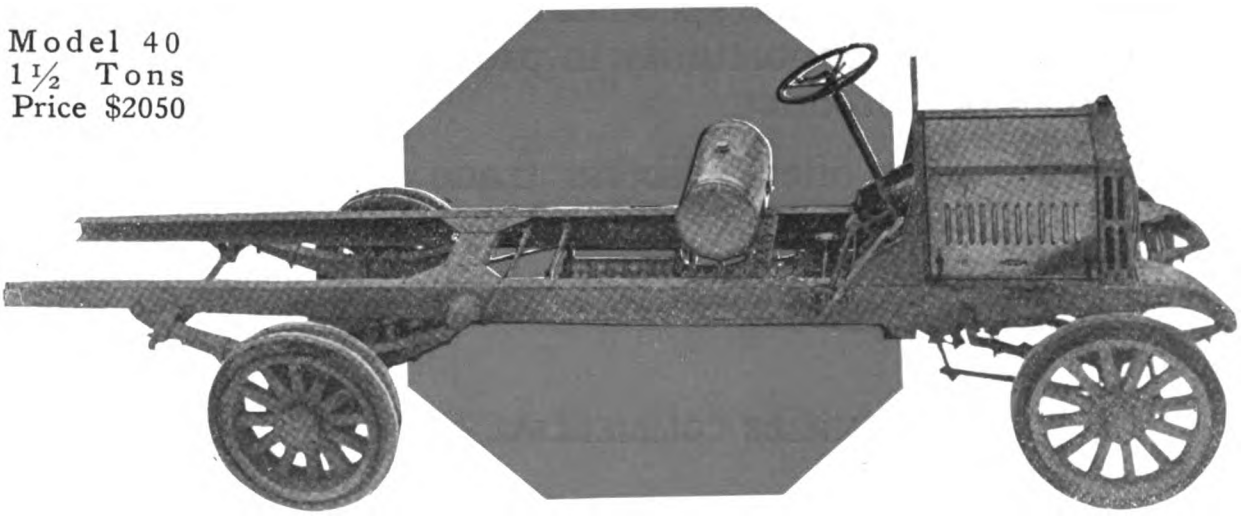
Brown - Lipe Gear-sets

Ross Steering Gear

Zenith Carburetor

Prudden Wheels

Model 40
1½ Tons
Price $2050



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KREBS TRUCKS

The component parts of Krebs Trucks bear the names of those whose supremacy in their respective fields is acknowledged by the engineering experts of the industry.

In the assembly of those parts we employ only skilled mechanics who work under the close supervision of trained experts carrying out the plans of experienced engineers and designers.

Krebs Efficiency is a known factor. Our product has always delivered more service at less cost per mile than we have claimed for our vehicles.

Our organization and our reputation is a steadfast guarantee of our reliability. We stand back of the performance of every truck that leaves our factory. Your requirements and ours are identical.

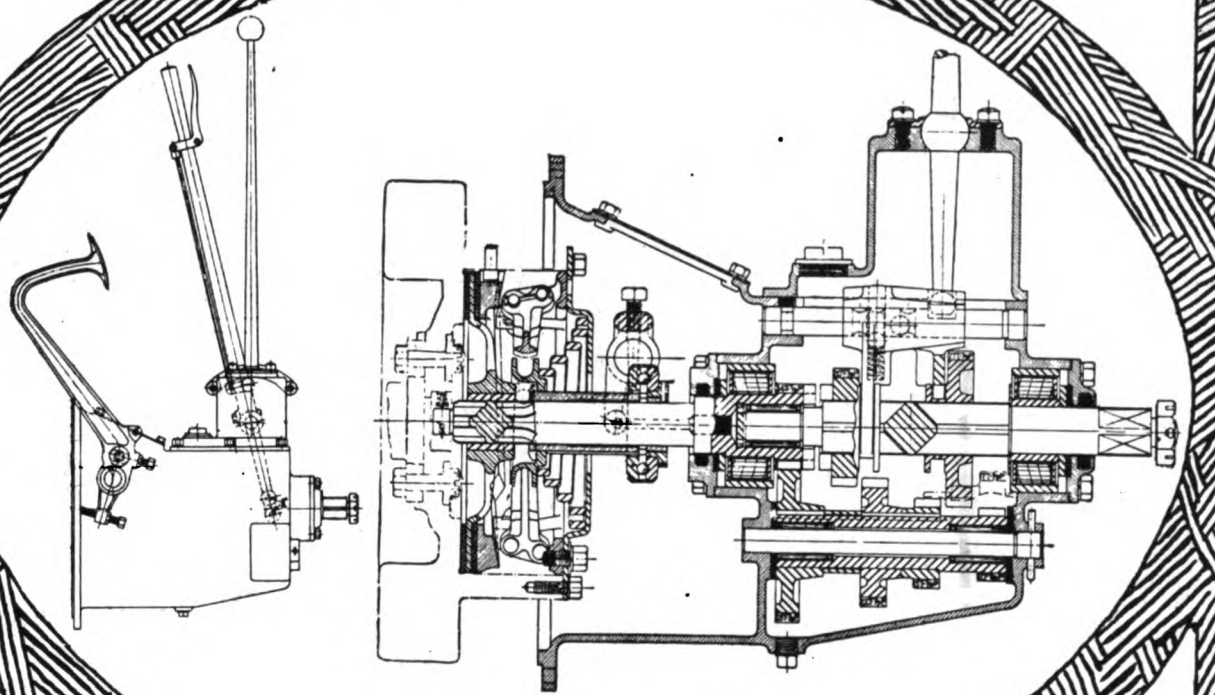
The man who buys a Krebs Truck expects Service. He will get better Service than he expects.

Send for our detailed specifications—we will gladly welcome any opportunity to prove the exceptional merit of our product.

To dealers we offer a liberal trade proposition on the best selling line ever produced. Write us for details—it means a larger market and bigger business for you.

THE KREBS COMMERCIAL CAR CO.
CLYDE OHIO

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THE NEW MODEL "L" COVERT TRANSMISSION

Specially designed for 1000 lb. delivery cars.

Recognition of the merit of Covert Transmissions has been such this year as to result in more than double the amount of business of any previous year, but owing to a very material increase in our manufacturing facilities we are able and desirous of taking on a few more accounts.

We solicit the inquiries of builders of automobiles and motor trucks.

COVERT GEAR COMPANY, Inc.

Sales Offices:
DETROIT, MICH.

Factory:
LOCKPORT, N. Y.

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7000 LB BESSEMER MODEL "E"

WHEN YOU BUY A BESSEMER YOU BUY THE BEST

The Worm Drive is fast becoming the **standard** drive for trucks.

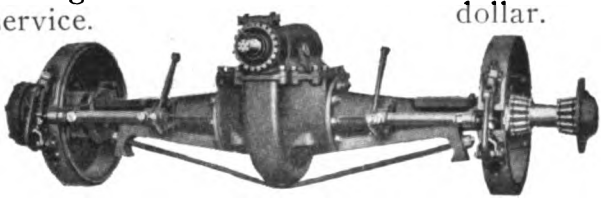
It has proven more highly efficient than any other type—it delivers more power direct to the rear axle—it is noiseless and has a tenacious, even torque that will pull a heavily loaded truck out of bad holes.

On account of such merit we were convinced that the Worm Drive was the highest type of drive for our heavy-duty trucks—our Model E 7,000-lb. and Model D 4,000-lb. This feature costs more, but it gives better and more lasting service.



The Worm-Drive 7,000-lb. BESSEMER has the mechanical construction throughout, which will make it the choice of the discriminating, critical buyer. It is the truck that fits in with big business.

Compare the 7,000-lb. BESSEMER with any other truck of like capacity and at anywhere near its price. Good business judgment will convince you that the BESSEMER has more worthful value, dollar for dollar.



Specifications

Capacity—7,000 pounds. Chassis Weight—6,025 pounds. Motor—Continental, four cylinder, cast in pairs, L head, 4½-in. bore x 5½-in. stroke. Motor Lubrication—Constant level splash, pump circulated. Ignition—Bosch High Tension Magneto. Carburetor—Rayfield. Gas Control—Hand Lever on Steering Column with foot throttle. Steering Gear—Ross Model BM Gear, 20-inch wheel. Drive—Left Hand Steer, center control. Brakes—18 x 3¼-in. Service and emergency—both internal expanding. Frame—Pressed steel, 6⅜-in. x 5½-in. x ¼-in. stock. Standard Frame back of driver's seat 135-in. Springs—Front, semi-elliptic, 2½-in. x 44-in.; rear, semi-elliptic, 3-in. x 56-in. Front Axles—I-beam Section, 3⅝-in. x 2¼-in. Wheels—Artillery type; S.A.E. 14 spokes, 2½-in. square front, 3-in. square rear. Tires—Front, 36 x 5-inch single. Rear, 36 x 5-inch dual. Solid. Wheel Base—Standard 150-in. and 175-in. Clutch—Cone type, 15¾-in. dia. x 2⅝-in. face. Transmission—Brown Lipe Model 60, selective sliding gear, three speeds forward and reverse. Drive Shaft—Tubular Propeller Shaft with full set of universal joints, connecting transmission with rear axle. Rear Axle—Worm gear, full floating type. Worm gear ratio, 10½ to 1. Gas Tank—Capacity 20 gallons. Seamless pressed steel, located under driver's seat. Equipment—Two side and one tail oil lamp, horn, jack and set of tools. Body—Built to suit all requirements. Standard 12 or 13 feet. Painting—Optional. Lettering—As specified.

The Timken-David Brown Worm Drive Axle

This is a specialized product. It has a big reputation, gained by a number of years of "railroading" on some of America's leading trucks. It is heavily ribbed and trussed to withstand the stresses and strains. This axle will carry the heaviest loads year in and year out.

Price of Chassis in Lead
F. O. B. Factory

$3,100

DEALERS—You cannot secure a more satisfactory, profitable agency. Write us for our liberal selling plans.

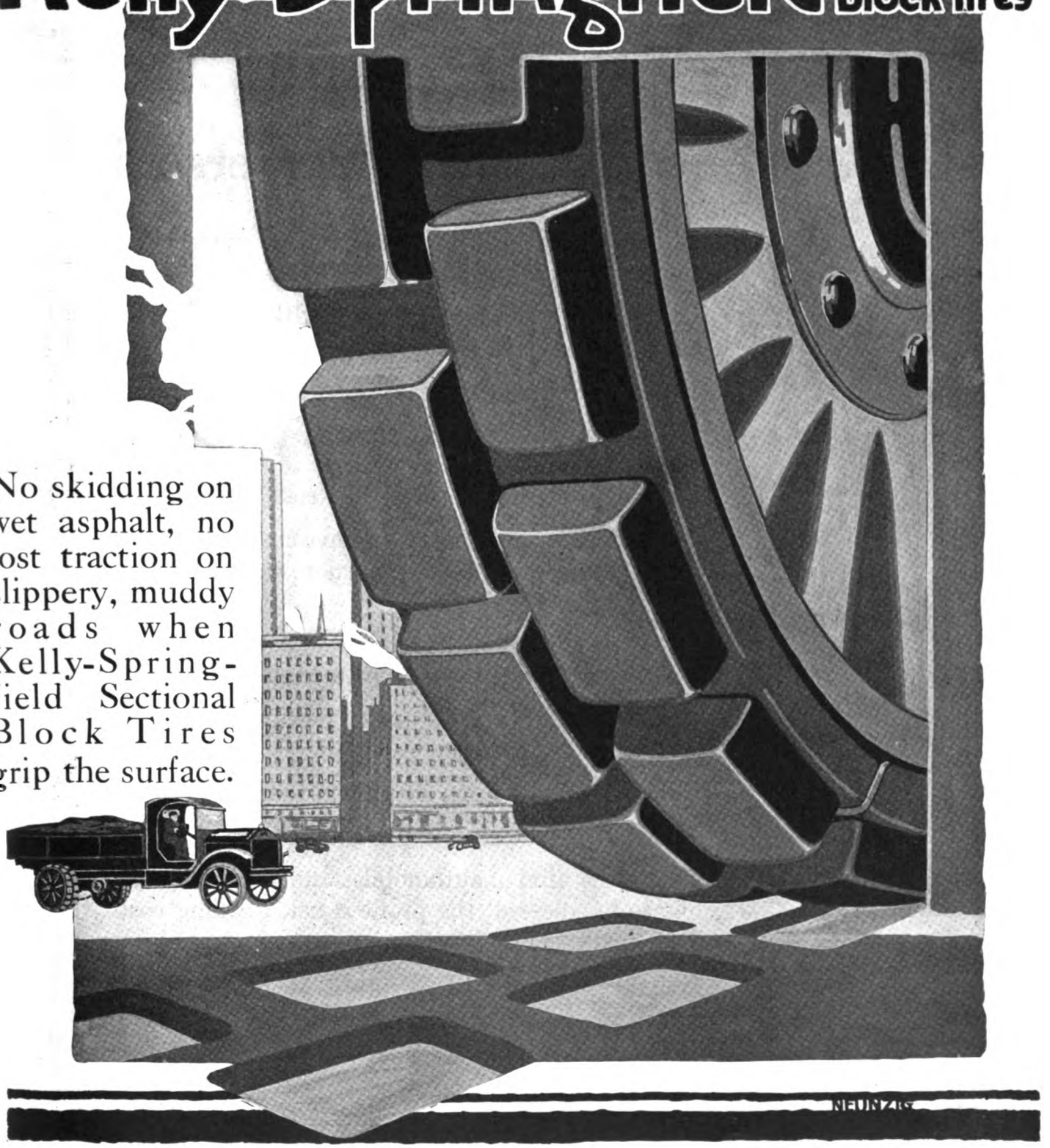
Inquiries from territory in New England and most of the Eastern States should be addressed to

Bessemer Motor Truck Corporation
Lexington Avenue and E. 42nd St., New York City



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Kelly-Springfield Sectional Block Tires

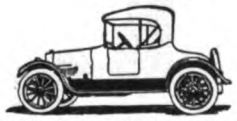


Kelly-Springfield Tire Company, Akron, Ohio

Branches in all principal cities

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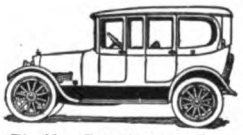
Oversold
—Always Oversold



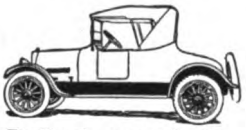
The New Four-Cylinder, 5-passenger Reo Roadster, $875



The New Reo the Fifth, "The Incomparable Four," $875



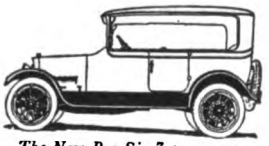
The New Four-Cylinder Reo Enclosed Car, $1025



The New 4-passenger Reo Six Roadster, $1150



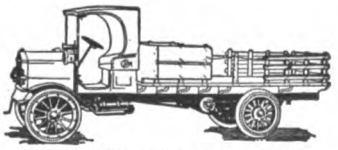
The New 7-passenger Reo Six Touring Car, $1150



The New Reo Six 7-passenger Sedan, $1750



1500-pound Reo "Speed Wagon," $1000



2-ton Reo Truck (Chassis only, with Driver's Seat and Cab), $1650

All Prices are f. o. b. Lansing, Michigan

Wherever you see a Reo dealer you see one who has more orders than he can get cars to fill.

Oversold is a chronic condition with Reo distributors and dealers.

Has been so since the first Reo left Lansing.

Never since the first Reo was made and its quality shown, has it been possible for us to make enough cars to supply all who wanted Reos.

Of course it's aggravating to have customers waiting—begging—pleading—for more cars than you can supply.

But it's a mighty sight more aggravating to have a stock of cars on the floor you can't sell.

The last condition happens to most dealers—sometimes. To a Reo dealer—never.

Always there are more customers than cars.

And that is true also of Reo motor trucks.

That's the kind of automobiles and trucks dealers like to handle—all the profit is net. Selling cost low—maintenance lower.

Perhaps you can't now—but it behooves you to watch: some day you may be able to get the Reo line.

(160)

Reo Motor Car Company
Reo Motor Truck Company

Factories: Lansing, Michigan

"THE GOLD STANDARD OF VALUES"

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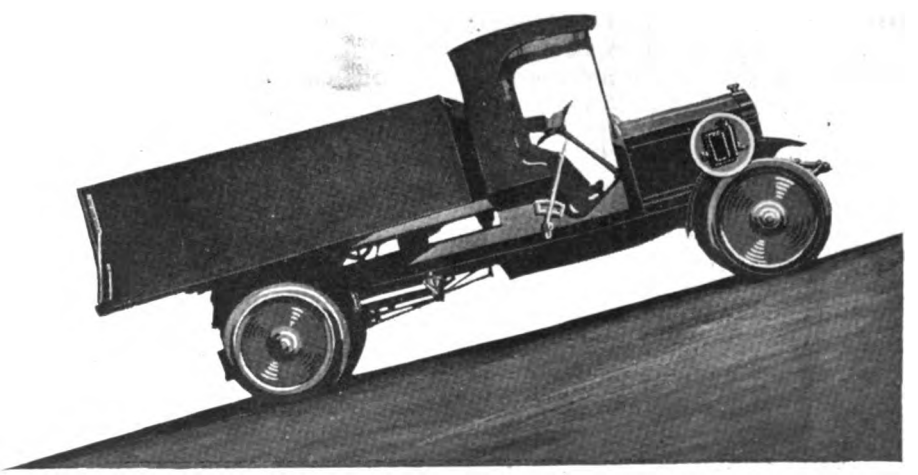
A motor-boat does harder up-hill work than a truck

Motor boats run steadily against a water-resistance as great as the gravity-resistance of a motor-truck going uphill.

The best marine engines have to use the best magneto—

Berling WORTH MORE DOES MORE Magneto

The same reasons why these best marine-motors—(the Sterling, Speedway, Van Blerck, Universal, Winton and Wisconsin) use the Berling, are the reasons which recommend this magneto to motor-truck makers who prefer operating-efficiency to first-cost economy.



ERICSSON MANUFACTURING COMPANY
Military Road, Buffalo, N. Y.

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"Never Saw Its Equal In Forty Years"

J. C. Coleman and Sons, big Eastern contractors, recently had an excavating job that looked impossible for horses—or an ordinary motor truck.

The peculiar shape of the excavation made it necessary for the load to be backed *up a 32 per cent grade,* around a corner and out through a narrow entrance way.

The problem was a difficult one.

But a 6 ton Garford Motor Truck was put to work at the seemingly impossible task.

It was loaded with thousands of pounds of dirt and stones.

And it backed up the hill, around the curve and into the street,—easily,—quickly,—and with no fuss.

"Never saw its equal in forty years," said Mr. Coleman.

Such service is not unusual for Garford Motor Trucks. Doing the difficult things is merely part of their day's work.

And what they do for J. C. Coleman and Sons, Garford Motor Trucks can do for *others.*

They will serve your customers just as faithfully and efficiently in their lines of business whether they are large or small.

Garford Motor Trucks are built in a variety of sizes and capacities and will meet every business requirement — economically and efficiently.

The Garford line backed by eleven years' prestige furnishes an unequalled money-making proposition for dealers.

Write for full information. Address Dept. 103.

The Garford Motor Truck Company, Lima, Ohio

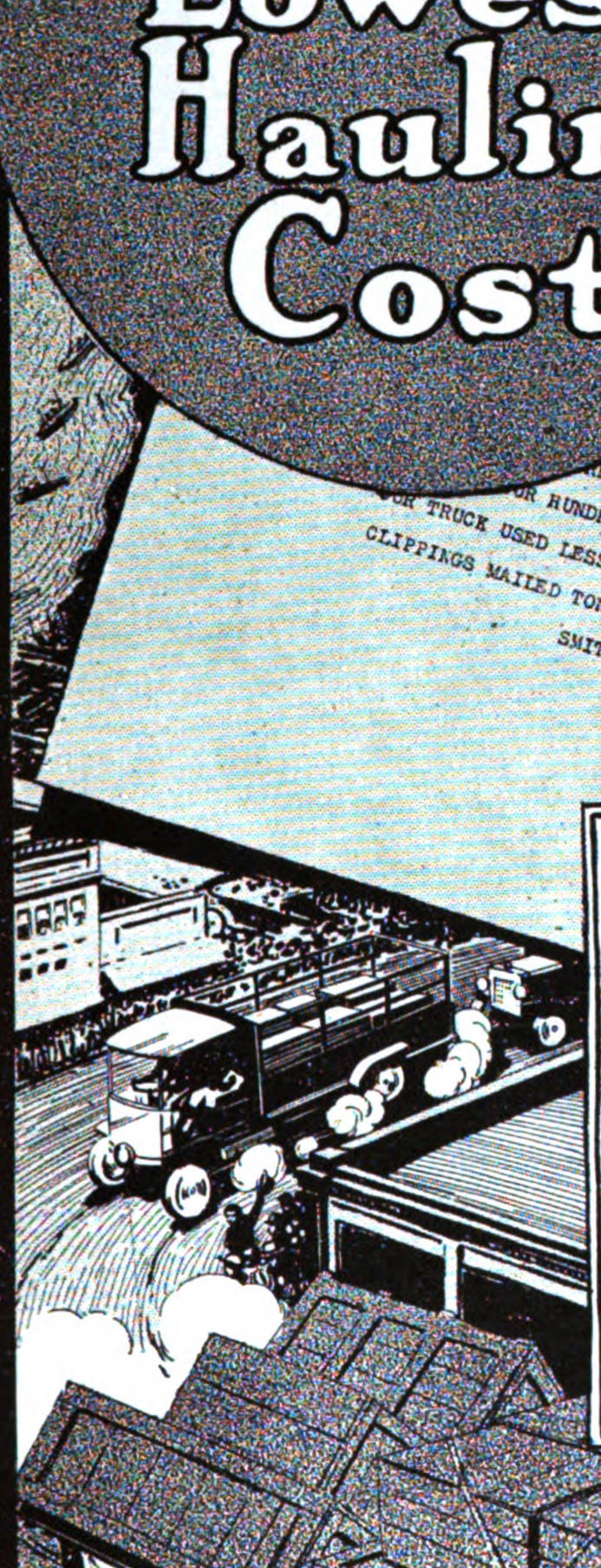
Manufacturers of

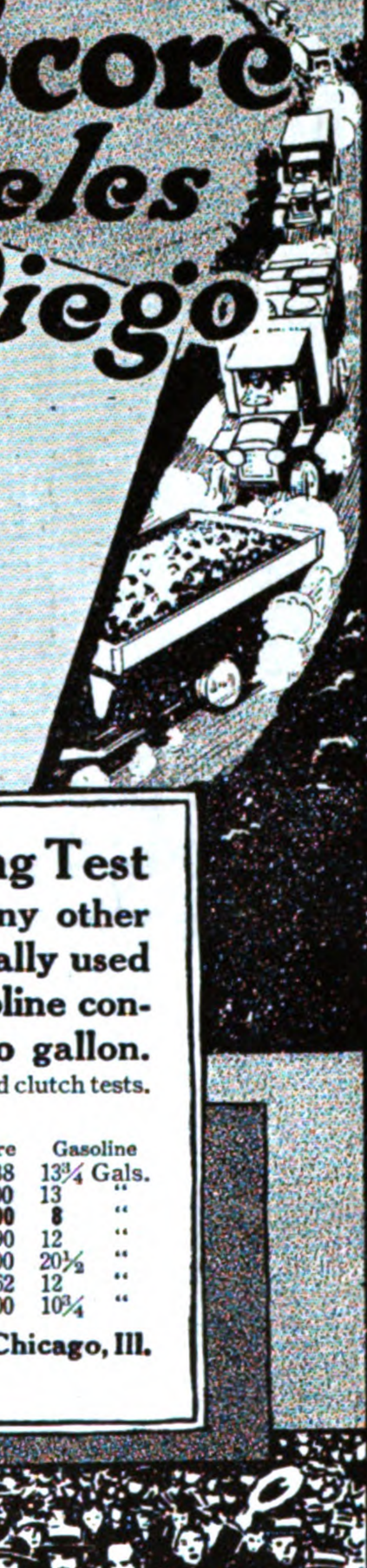
Trucks of 1, 1½, 2, 3½, 5 and 6 ton capacity
Tractors of 4½, 7, and 10 ton capacity

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World's Lowest Hauling Cost

SMITH Form-a-Truck Perfect Score Los Angeles to San Diego





LOS ANGELES CAL JULY 17
SMITH FORM A TRUCK CO
1470 MICHIGAN AVE CHICAGO
LA25SXCBI 83 NL
ONE THOUSAND POUND LOAD VIM ELEVEN HUNDRED VIM
ONE THOUSAND NINETY STEWART ONE THOUSAND THIRTY
NINETY G M C SIXTEEN SEVENTY STUDEBAKER TWENTY ONE
A TWO THOUSAND NINETY AUTOCAR THIRTY ONE FIFTY G M C
HUNDRED LITTLE GIANT THIRTY ONE THIRTY DENBY THREE THOUSAND TEN
TRUCK USED LESS OIL AND GAS FINISHED WITH HIGHEST BRAKE AND GEAR TESTS
CLIPPINGS MAILED TONIGHT MORE STORIES THIS WEEK CLIPPINGS WILL FOLLOW
SMITH FORM A TRUCK CO 235AM

Wonderful Economy Proved in Grilling Test

Shows 65% greater gasoline economy than any other 1-Ton truck entrant—60% to 30% less fuel actually used than any other truck carrying half the load. Gasoline consumption of Smith Form-a-Truck 15 ton miles to gallon.

Less oil used than by any other truck entrant—highest marking in brake and clutch tests.

READ THE OFFICIAL SUMMARY

Truck	Load lbs.	Score	Gasoline	Truck	Load lbs.	Score	Gasoline
Doane	12,000	1,000	30 Gals.	G. M. C.	1,670	938	13¾ Gals.
Vim	1,100	1,000	9¾ "	Studebaker	2,120	1,000	13 "
Vim	1,100	1,000	10 "	**Smith Form-a-Truck**	**2,090**	**1,000**	**8** "
Vim	1,200	1,000	10½ "	Autocar	3,150	990	12 "
Studebaker	1,090	1,000	10 "	G. M. C.	7,400	1,000	20½ "
Stewart	1,130	1,000	8½ "	Little Giant	3.130	962	12 "
Little Giant	1,590	1,000	14 "	Denby	3,010	1,000	10¾ "

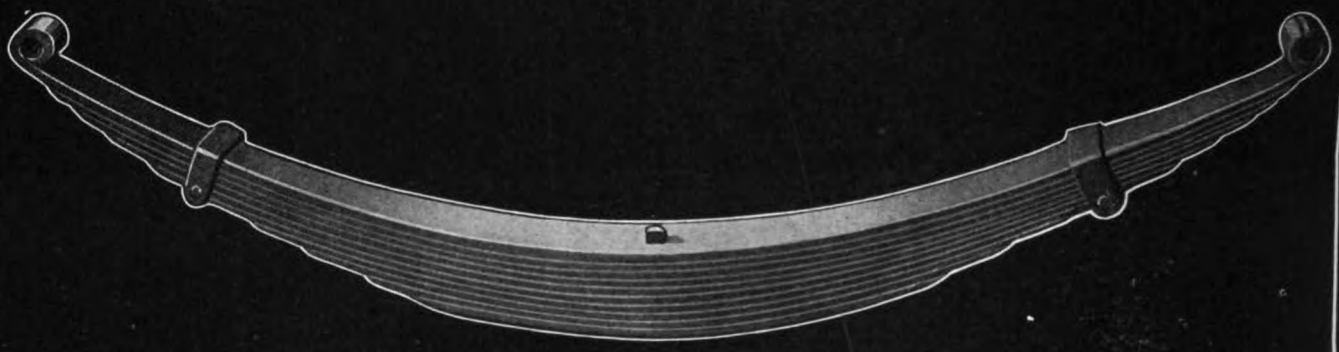
SMITH FORM-A-TRUCK CO., 1470 Michigan Blvd., Chicago, Ill.

Changes now being made in several important territories, applications from responsible dealers will be considered.

Los Angeles to San Diego

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"The Spring Is the Thing"



MATHER

Scientifically Heat-Treated

SPRINGS

designed to insure

Maximum of Elasticity and Endurance

with

Minimum of Vibration

Genuine made only by

The Mather Spring Company

Toledo, Ohio

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HESS-BRIGHT'S CONRAD PATENTS ARE THOROUGHLY ADJUDICATED

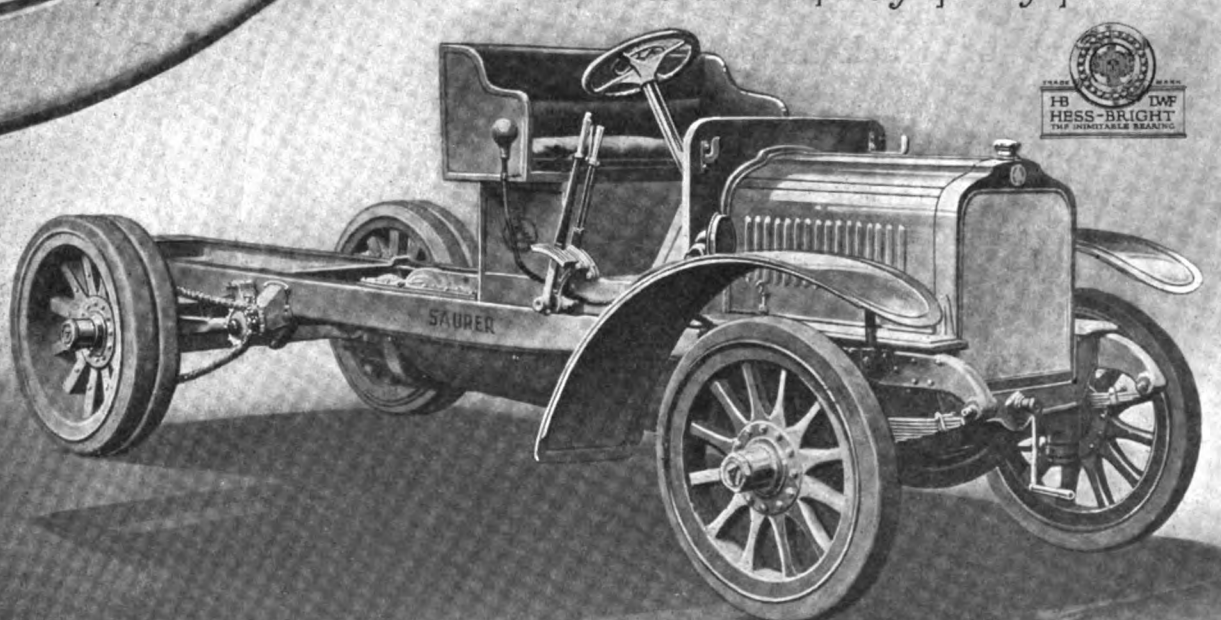
HESS-BRIGHT BALL BEARINGS

HAS IT EVER OCCURRED TO YOU that if the makers of a motor-truck choose HESS-BRIGHT BALL BEARINGS in preference to all other makes of bearings, it is done with the single purpose of giving the customer the best to be had, even though it increases the cost? The first cost of HESS-BRIGHTS is necessarily high.

The manufacturers of the SAURER TRUCK could easily substitute cheaper and inferior bearings, *but they won't if they can avoid it.* Their preference is HESS-BRIGHT BALL BEARINGS.

There have been instances since the beginning of the European conflict when we have not been able to supply our customers' requirements, but we are overcoming these difficulties by our rapidly increasing production.

The selection of HESS-BRIGHTS by the manufacturers of any motor vehicle is positive indication of earnest endeavor to build a purely quality product.



HB DWF
HESS-BRIGHT
THE UNIMITABLE BEARING

THE HESS-BRIGHT MANUFACTURING COMPANY
PHILADELPHIA, PA.

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FULLER TRANSMISSIONS

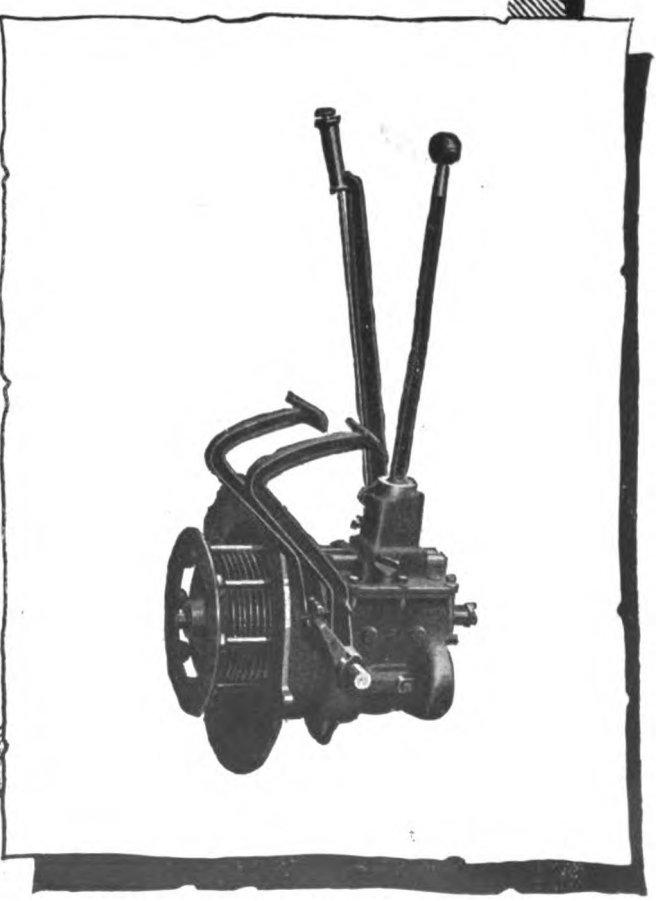
The adoption of Fuller Transmissions by truck manufacturers whose products have repeatedly demonstrated their ability to easily transport above capacity loads under all conditions of roads, is striking evidence of merit.

It bespeaks the merit which comes as a result of proper design, selected material, scientific treatment, skilled workmanship and a reputation gained only by those who deserve it.

The simplicity of Fuller Transmissions, their all around efficiency and lasting qualities have won us the endorsement of truck engineers.

You will profit if you will take a leaf from the experience of others.

FULLER & SONS MFG. CO.
Kalamazoo, Mich.



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The COMMERCIAL VEHICLE
Read by Business Men

Published on the first and 15th of every month
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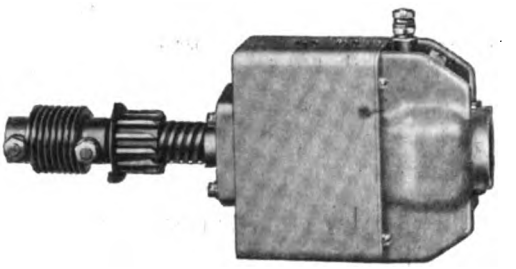
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Lighting
Ignition
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TRUCKS



Starting Motor—inboard type

YOUR trucking costs depend upon your equipment. Time and safety are the greatest factors. Generous light and sure, quick starting are essential.

Gray & Davis dynamo is designed for low speed. Charges battery at all driving rates. Output is uniform. Battery is always fully-charged.

Gray & Davis starting motor is constructed for strength. Alignment, perfect. Frame, electrically welded.

This system starts the engine under all circumstances. Ideal running conditions remain permanent.

GRAY & DAVIS, Inc.

Boston, Mass.

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The Autocar



Armour & Company have used Autocars since 1911



Morris & Company have given eight repeat orders for Autocars in the past year

Used by The Big Chicago Packers

Chassis, $1650

More than 4000 concerns in all lines of business are using AUTOCARS



The Cudahy Packing Co. operate Autocars in twenty-one cities



Wilson & Co., formerly Sulzberger & Sons Co. have standardized on the Autocar

THE country's greatest concerns—keen buyers of equipment whose engineers accept none but the best—use Autocar Delivery Vehicles. Many of them have standardized on Autocars, operating large fleets.

For the big Chicago Packers—for the meat market owning one or two trucks, the Autocar has proved its great value and economy in all parts of the country and under all conditions.

Rugged in construction, it stands up year in and year out loaded to capacity. Low in operating cost, it pays even when lightly loaded.

The Bushwick Pork Packing Company of Brooklyn say:

"Our Autocar is a 100 per cent investment—has brought us new trade we could not have secured otherwise and has improved the trade we already had. For example, we used to deliver away up at the Harlem Market with horses. They got there between 10 and 11 o'clock, after the market was all over. Our Autocar delivers there by 6 o'clock and has built up our trade in that market alone over 300 per cent."

Write for Autocar Catalog and list of users

THE AUTOCAR COMPANY, ARDMORE, PA.

Motor Delivery Car Specialists **Established 1897**

Sales and Service Plants

New York, Newark, Chicago, Providence, Philadelphia, Los Angeles, Boston, Washington, D. C., Baltimore

Represented by Dealers at other Points

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The COMMERCIAL VEHICLE
Read by Business Men
Vol. XV October 1, 1916 No. 5

Efficient Loading and Unloading Spell Success for Jevne Truck Fleet

Unit Box Packing and Highly Developed Routing System Eliminate Profit-losing Vehicle Delays of Los Angeles Grocer

LEADERSHIP is simple—a matter of picking the right principles and following them. Jevne had to have efficiency in its delivery fleet. The company picked the motto of Walter Johnson, star of the diamond, whose victories for the Washington nine have won him national renown, Speed and Control—there you have the fundamental idea. Baseball and truck operation. Some difference—but look at Walter Johnson, and learn of Jevne's. Results are big.

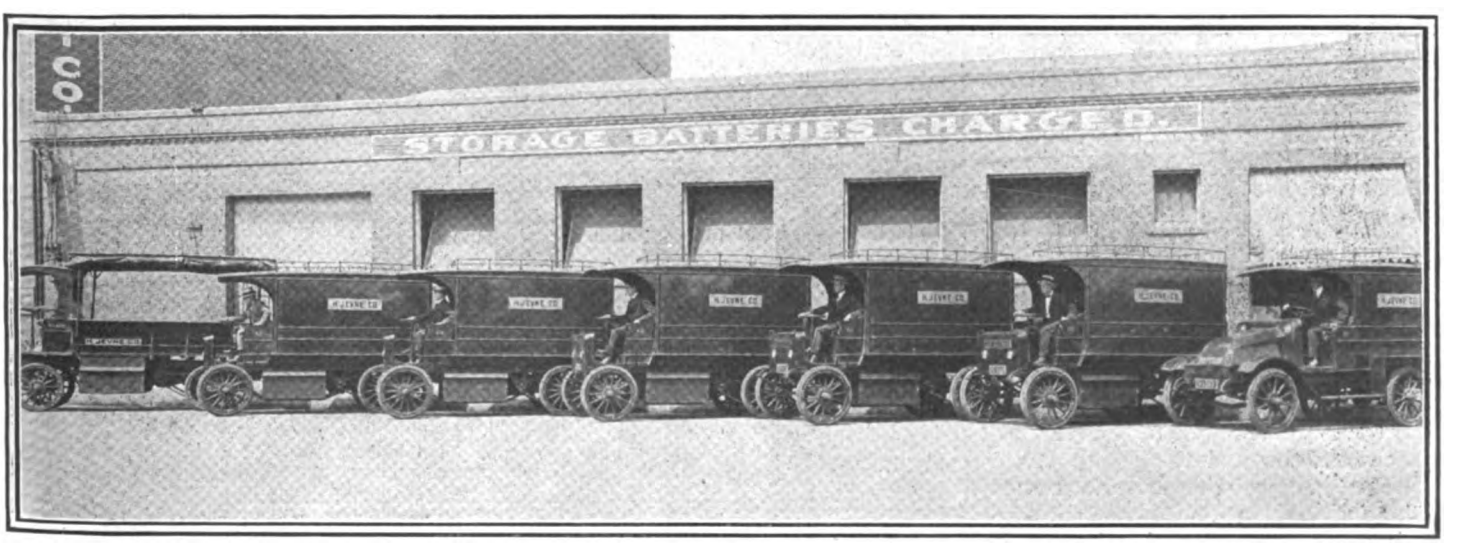
The speed idea is logically expressed in the firm's fleet of Autocars for deliveries in the city's outskirts and suburbs. Jevne's at present operates a fleet of twenty trucks, twelve of which are 1½-ton Autocars, one a 2-ton Packard, seven G. V. electrics, five of 1 ton, and one each of ½ and 2 tons. The Autocars are used for the outer range of delivery. The 2-ton Packard is used for a certain heavy suburban route and the G. V.s for economical delivery on close-in routes. At first they were confined to a 3-mile radius but now, in view of the service given, the limit has been stretched to 5 miles. The Autocars are operated in general at the full speed permitted by the ordinances. At first governors were tried to prevent overspeeding, but these were taken off, as they did not work satisfactorily. A Ford is also used for special deliveries.

Unit Box System Eliminates Delays

Jevne has thoroughly learned the secret of successful truck operation—keep the vehicle moving. Logical consideration of this has developed the subordinate idea that anything that needlessly delays the driver delays the truck, and must be eliminated.

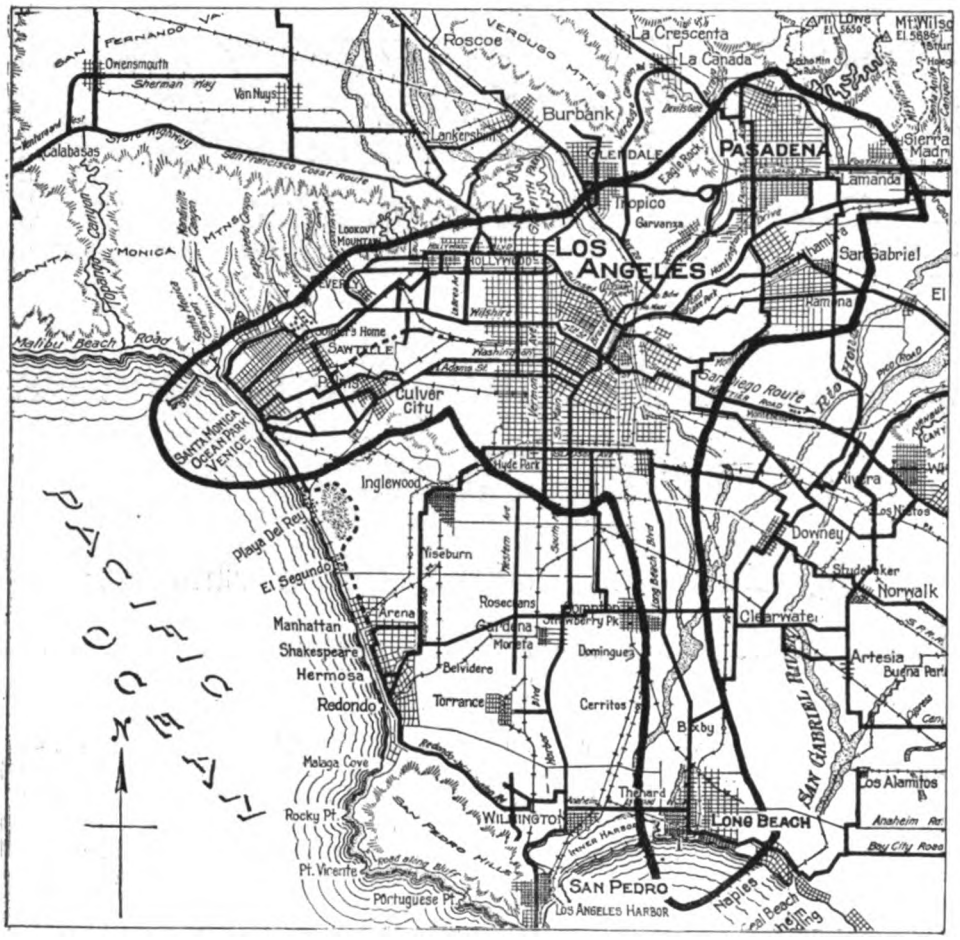
The outstanding factors in the success of the wait-killing campaign the company has waged are the unit box-packing system, the highly developed headquarters routing system, and the close supervision and intensified study of individual routes.

The unit-box system fits naturally into a system of operating supervision and cost accounting units. The system makes it also a delivery unit—one checking-in per stop, one grab for the goods per stop, at one known spot in the truck, and one check-in responsibility per stop.



The seven G. V. electrics used by the Jevne company for delivering its goods consisting of groceries, meat, candy, bread and wines within a 5-mile radius of the plant. Five of the trucks are of 1-ton capacity, one of 2 tons and one ½-tonner

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Map of Los Angeles and the adjacent cities of Pasadena, Culver City, Santa Monica, Ocean Park, Venice, San Pedro and Long Beach. The heavy line indicates the territory in which the twenty-one-truck fleet of the Jevne company makes deliveries. It is approximately 30 miles from Pasadena to Santa Monica or to Long Beach

Briefly, this system consists in providing boxes, in one of which all the packages for each individual stop are stowed. These boxes are packed and assembled by routes in bins upstairs; slips are arranged in their routed order by a route clerk, and the boxes and slips for a load are sent down to the loading platform by ordinary elevators. The unit boxes are made in four sizes, all of the same dimensions as to width and length, but varying in height in the proportions of the unit, one and one-half, double and two and one-half times the unit size. The width and length of these unit boxes is so fixed that when packed in the bodies they make a compact load. Preparation of a load upstairs is facilitated by this, as the route man knows the number of boxes to a tier and the number of tiers a truck will hold. The routing is done by a routing clerk.

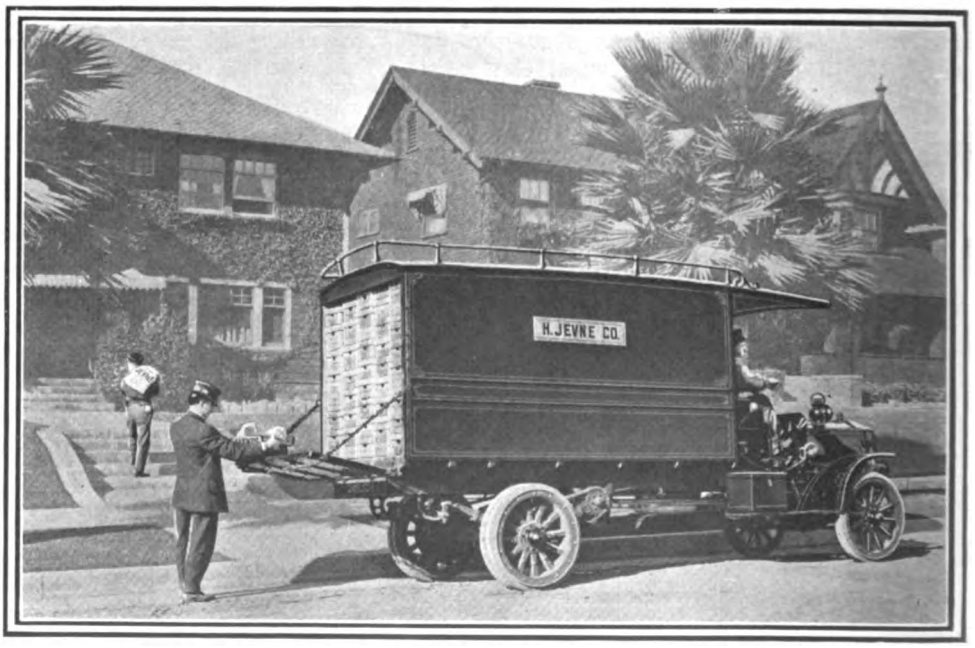
Loading is done by two helpers and the driver if he is not otherwise engaged in reporting, etc. Every box is checked in, and the empty box is checked out on the driver's return. The unit-box system saves checking individual items when loading. This is done upstairs, where it does not delay the truck. The last box which is to come out is placed under the seat and the first to come out next the tailboard. A special route man handles the night bread deliveries. The route man is responsible for loading the boxes in the order in which they are to be delivered.

If instructions as to how a delivery is to be made must be given by any department, all that is necessary is to inform the route man. Then no matter what driver takes out the load the delivery is under proper control. The route man obtains his information by maps and keeps abreast of changes in street conditions by obtaining data from the city officials. He has no other duties. The size limit of a load is determined by specific conditions affecting the route, or the day's business of the route. In some territories it is governed by mileage, in others by tonnage and in still others by bulk. More often than otherwise tonnage is the limiting factor.

Layout of Loading Platform

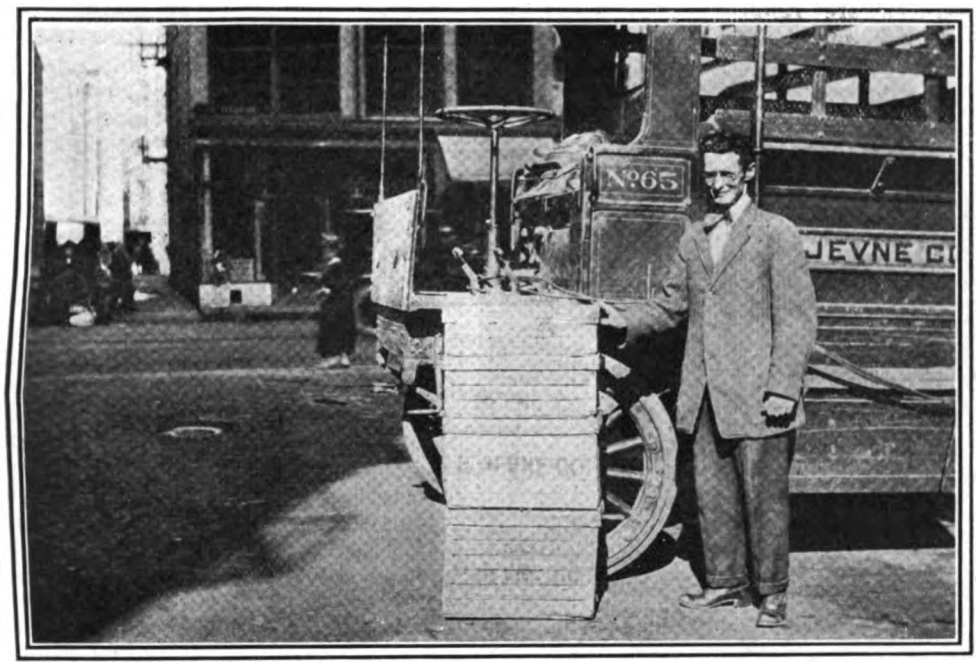
The loading platform has the receiving end toward the street. The loading end occupies the balance of the platform. Horse-drawn vehicles of the commercial transfer companies back in with goods from the freight houses without getting in the way of the trucks.

At the receiving end of the platform goods are unloaded directly onto handtrucks and wheeled to the scales beside the receiving desk; a small scale at the left takes care of incoming express packages which must be weighed to check the bills. From the scales the handtruck is wheeled only a few feet to the elevator which takes it to the receiving department on an upper floor. At the distant inner corner of the loading platform is the return-department desk. Here



One of the Jevne gasoline trucks at a suburban delivery point. Note that helpers are employed to conserve the truck time. Also note the manner in which the unit boxes are stacked in the truck body

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The four sizes of unit boxes employed by the Jevne company for the packing of its goods. Note that they are all of the same length and width, differing only in the height

all business with the drivers in relation to merchandise is handled. They turn in here all goods returned by customers, with the reasons for its return. This goods is sorted into bins and then loaded on handtrucks and sent up to the stockrooms. An additional duty of the man in this department is to help the driver unload and get away.

Records Kept on Plug Boards

He also receives the odometer records and keeps the records on the lanterns which are supplied to the men in winter when darkness sets in early. To keep track of the odometer records he has a plug board. He plugs every car as its record is turned in. A red plug indicates that the car is in the garage, a black that it is out for repairs. A blank hole indicates that the record must be obtained. A similar board is maintained for the lantern records.

System at Loading Platform

A charging circuit, with plugs at intervals corresponding to widths of the electric trucks are placed along the wall above the loading platform; the electrics are charged while they are being loaded.

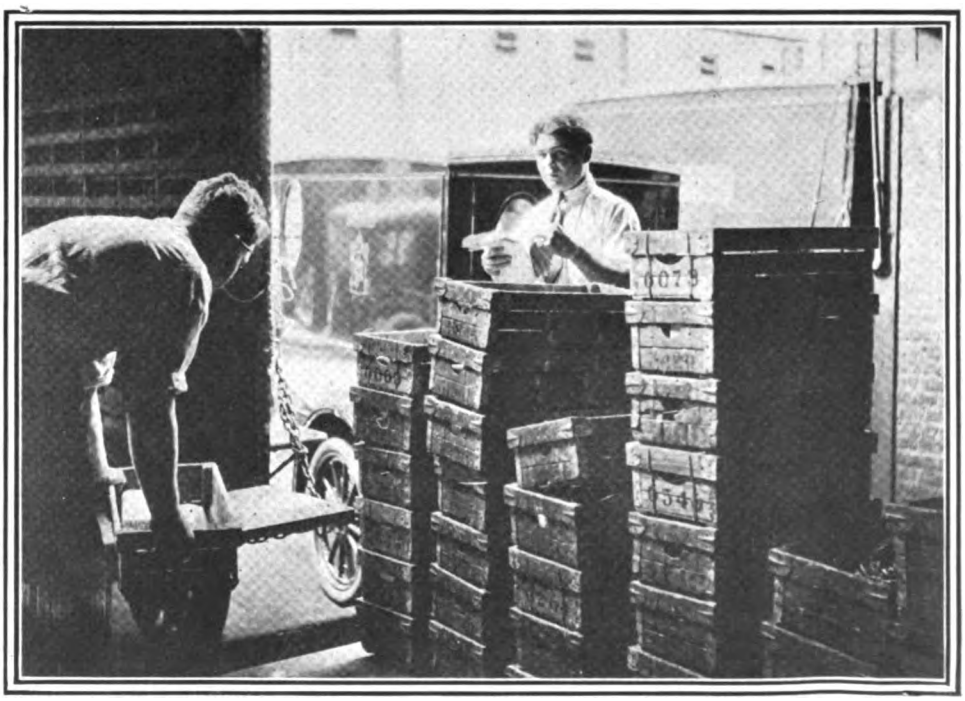
Under the existing system the driver of a truck handles his duties in such a way that he is not obliged to delay the loading or outward movement of the truck for any reporting or clerical duties.

It is the object of the firm to have loads ready for each vehicle as soon as it reaches the store. To avoid congestion the goods to be loaded is held upstairs until the vehicle has come in. A load is provided at the platform for the next truck expected, but the platform is not congested with loads for future arrivals. The driver checks in his boxes and returned goods, is released from that load and charged with a new one. Often the driver is not present when his load is being put on the truck as he may be required to turn in information required by the adjusting department, talk to the route man or the superintendent. It takes about 25 minutes or more to load a truck on an average. Two helpers and a checker, with the driver when available, stow the load. Numbers are read off from the routed slips, beginning with the last delivery, which is stowed at the front, and the boxes loaded in a definite stowing system in the reverse order of that by which they will be taken out at the stops.

Method of Route Supervision

Control is effected by obtaining definite time, stop and mileage records of every trip, which are tabulated and filed by routes. Thus there is available daily a means of noting inconsistencies, and the accumulated records afford a basis for analytical comparisons for improvement of service and reduction of costs.

Records of odometer mileage are kept of every trip and a record is also kept of the stops. The delivery superintendent has this record of stops before the driver goes out. They get time in and time out for every trip by registry on a time clock. With this information it is easy to compute costs, which are constantly being taken and analyzed by the delivery department. This work is not only valuable in promoting delivery efficiency, but also supplies useful data to the sales department, as it shows where scattering business can be put on a better-paying basis by special effort. Efficiency on the individual route is constantly being built up by close personal supervision, persuasive efforts and tests conducted by switching men from one route to another.



A scene at the loading end of the Jevne truck platform showing a checker reading off the numbers of the unit boxes being loaded into the truck by the driver's helper

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Standards are developed by putting men of known steadiness and capacity on a route under observation, and finally by the superintendent or his assistant personally going over the route, either with a driver or trailing behind, or intercepting him for surprise tests similar to those conducted on railroads. Formerly inspectors did this work, but they were dispensed with as the system of tabulating was improved and the superintendent of delivery and his assistant developed their knowledge of conditions and ability to interpret records to an extent that made inspectors unnecessary.

The Jevne Garage

The trucks are housed in the company's own garage, a brick building, formerly its stable, which had its floor cleared completely and steel supports put in. The electrics are charged here when reporting for cleaning and inspection. The company operates a dynamo for changing current from alternating to direct. The wash racks are so arranged that the vehicles are cleaned without moving from place to place. This is an important time-saving feature. The trucks are ranged along the walls with a water pipe behind them, the floor sloping to a drain at the front of each vehicle, where the water flows into a drainage channel close to the wall. Electric light leads are provided back of each truck to give light for washing or repairs. Grease and oil are supplied to the trucks in their places on the floor by means of a portable carriage. The garage is equipped with hoists for lifting truck bodies and engines.



The time clock at which the drivers register in and out on every trip, thus giving accurate records for the determination of route efficiency

The policy of the Jevne Company is to keep its investment in motor trucks active all the time. If a vehicle goes into the garage it is inspected. If O.K., a new driver takes hold at once and it goes out on its route. Up to date the Jevne company has found no reason to rest its vehicles. It has had some of the motor trucks in service 5 or 6 years with no detrimental effect which they can trace to continuous service, as distinguished from that produced on trucks which have made an equal mileage under conditions where they have had more opportunity to rest.

The electrics are only charged in the garage when they are standing there for a few minutes. The normal routine is to charge them at the loading platform.

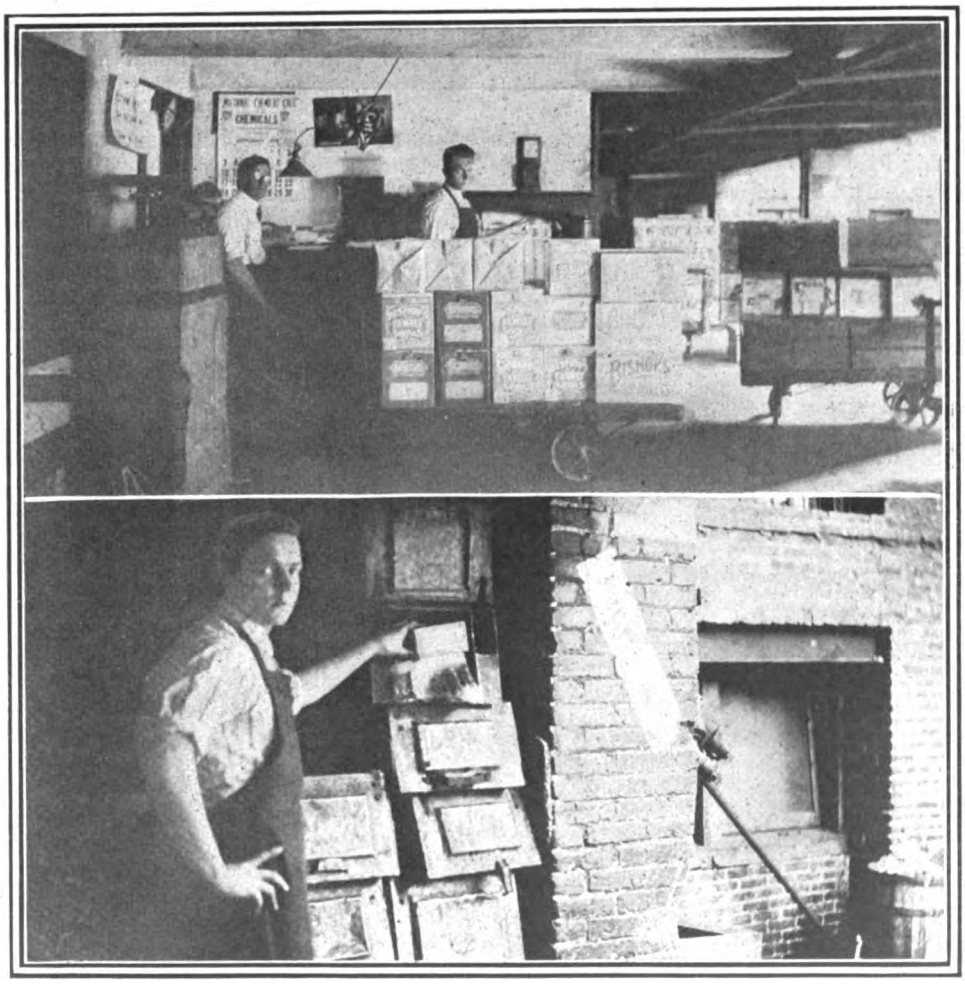
The Jevne Company's delivery problem is a complicated one, as indicated, by the comprehensive nature of the firm's business. The company is a grocer, manufacturer, bottler, bread baker, candymaker, coffee roaster, importer and exporter in the broadest sense of the word. It operates five manufacturing businesses aside from its wholesale and grocery business. In the daylight hours it uses the trucks for wholesale and retail deliveries of groceries and kindred supplies. At night they are used to deliver bread. The territory covered is all of that district tributary to Los Angeles, known as From the Mountains to the Sea, that is, from the foothill cities of Pasadena, Altadena and Alhambra to the beach cities of the coast line from Santa Monica to Long Beach. This is a territory some 30 miles across.

Scope of the Delivery Service

The character of the loads embraces a variety of hard, breakable and perishable goods of all classes, running from small pieces of French pastry or delicate fancy candy work to bottles of wine, carpet sweepers or barrels of ginger ale, butter and cooked meats. The loads are packed in bags, boxes, cans, glass, etc., in fact in every conceivable class of package.

Due to the improvement in streets and roads caused by the wider use of motor vehicles, the company now has less breakage than when it was using horse delivery under the conditions then existing, even considering that careless driving will create more damage aboard a truck than a more slowly-driven horse wagon.

A constant object is to improve the neatness and compact manner in which goods reach customers. At



At the top is shown the receiving desk on the loading platform, the checker's desk, the scale on which the goods is weighed and the type of handtrucks used to transfer the goods to the upper floor of the plant on elevators. Directly above are shown some of the small ice boxes used for delivering perishable goods such as butter, meats, etc., during the summer season

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some seasons of the year ice boxes are used for perishables such as cooked meats, butter, roast chicken, etc.

The unit box system is an original development of Jevne's which insures the delivery of the goods in the best possible condition. It also speeds up the unloading and loading.

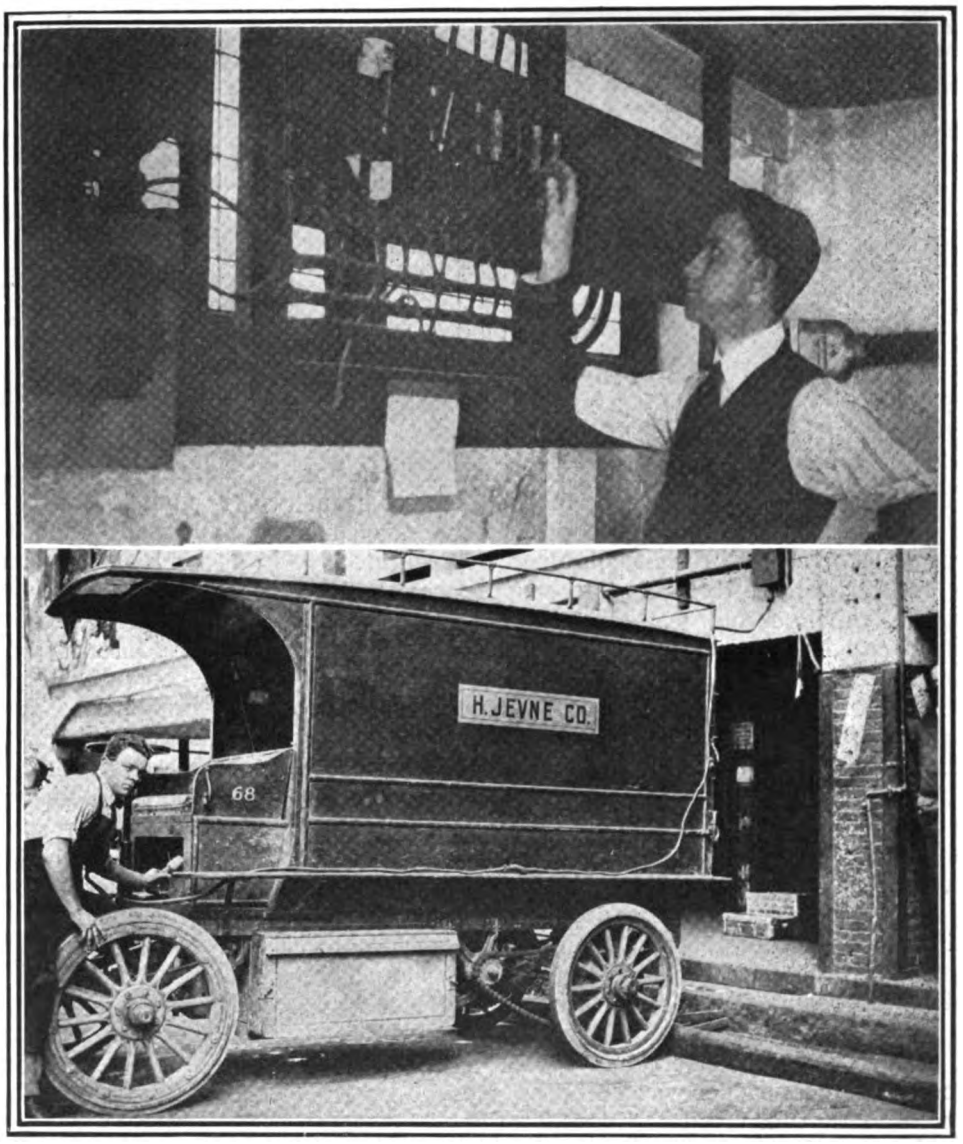
Records Visualize Routes

The constant effort of the delivery department has been to learn what the trucks will do and what the men will do. The men in charge of the delivery have been over every route with the driver. When the superintendent goes over the route with a man, he knows that the driver is putting forth his very best effort. If he makes 130 stops in a certain time the superintendent knows that is better than he will average under normal conditions. Every route is scheduled and the superintendent knows almost to the minute what time a truck is due to come in. If the normal delivery is 130 stops and the man has 90 stops on his schedule for that day it is known how much quicker he should be due back. After the men start out every day there is a tabulation on the delivery superintendent's desk showing the number of stops on each route.

The superintendent then knows just about where each man is at any minute of his trip. If a man comes in late the superintendent always follows it up and gets an explanation. At first it was very hard to get these explanations. The men did not understand the purpose. Now they have got around to the point of view of wanting to do good work and wanting to be appreciated. If a man has an accident he wants to have the superintendent know just what it was, so that his record will be clear. Recently, constant comparison of the work has led to the adoption of the policy of singling out particularly good work and commenting on it in a friendly way. This lets the men know that the firm notices meritorious service.

Advantages of Truck Operation

The Jevne company loads its trucks heavily. Its business is very different from department store delivery in this respect. While it is persistent in efforts to eliminate careless driving and over-speeding, schedules are made out for the men to make good time. The superiority of truck delivery is in its speed and it trys to get the advantage of this characteristic. Two men are usually put on a truck. This is expensive, some people think, but it considers the investment in the equipment. Where there is $2,500 tied up in a truck, it must be kept going or there is liable to be a loss that runs into considerable money.



At the top is shown the switch panel at the end of the loading platform for charging the electrics. At the bottom, one of the electrics backed up to one of the doors of the loading platform, showing the electric current cable by which its battery is charged while the load is being put on

An executive of Jevne's summarizes the broad result of its experience with trucks as follows:

"Of course trucks have expanded our business. We used to think we were doing wonders when we made Hollywood twice a week. Now our routine is two trips a day there. When we were driving horses we would never have attempted to handle trade in Santa Monica or the beach towns. Now they get service as regularly as districts closer in. The Beverly Hills section, half way to the sea, has become the same as city territory used to be. We could not have attempted to handle this distant trade with horses. Of course, there is a personal satisfaction in using trucks. As I look out this window and see our delivery fleet backed up here on a very hot day I do not have to worry about pushing a lot of unfortunate animals to the limit of their endurance in order to handle our business.

"We have both gasoline trucks and electrics. We have been operating electrics only about 1½ years, not long enough to get a fair perspective on their endurance.

"We have worked constantly in an effort to systematize our delivery. Speed and elimination of delays means service and it means profit. In order to secure these things one must have control and this means maintenance of schedule. We rigidly maintain our rule that only orders received before 6 p. m. go out on the next morning delivery. That truck starts at 7 o'clock and under no condition could anyone get aboard it a package which would not be ready until 7.05. We get this result by giving our customers dependable service. Suppose we broke the rule of accommodation of one customer. The

(*Continued on page* 16)

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The Freight Truck and the Two-Way Haul

THE inability of motor truck owners and operators to obtain full loads for their vehicles in both directions has been one of the greatest stumbling blocks in the way of a greatly increased use of trucks in the intercity haulage of freight.

There is little difference in cost between empty truck mileage and loaded truck mileage. If no load can be obtained for the return trip, the cost of hauling the goods on the outward trip must be based on the cost of the complete round trip. This makes for high truck rates. It limits the opportunity of the truck to compete successfully with the railroads. It is unfair to the truck. It is inefficient. It is a wastage which must be eliminated before the motor truck will come into its own in the haulage of freight between cities.

How can truck owners and operators overcome the waste of the one-way freight haul? The head of a large motor trucking concern in New York City overcame it by much study, hard work and perseverance. It was a long job and took 2 years.

By investigation he found that a manufacturing concern in one city was shipping freight by railroad to another city less than 50 miles distant.

He also found that it often took 2 or 3 days for the goods to reach its destination. By trucks he could deliver the goods in 6 hours—a great saving.

But he had no return loads for his trucks. Without them his truck rate for the work was in excess of the rail-plus-horse rates if he was to make a reasonable profit. He thereupon set out to find a manufacturer in the second city who was shipping goods by rail to the first city or its environs. After considerable investigation he found such a concern. He then made a complete study of the conditions under which his trucks would have to operate if they were to replace the railroad. He calculated the cost of doing the haulage, assuming loads in each direction. This enabled him to quote each of the companies a lower rate than by rail.

Besides quoting the manufacturers a lower rate, he also offered them quicker, direct deliveries with less liability of damage to the goods *en route*. He then offered both manufacturers contracts simultaneously. Each contract called for a minimum tonnage to be handled in a specified time. These were signed and the truck operator now has a lucrative business in which his profits are assured.

The above method, while it got results, was long and laborious. Why not take a hint from our British cousins across the sea, who have a much shorter method of obtaining two-way freight loads? In London there is a concern which makes a business of listing shipments of freight to be hauled by road vehicles between the principal cities. A concern hauling freight to one city gets into communication with the office of the listing company in that city and obtains information as to what shipments are available for the return route. It then quotes the shippers direct and gets the business if its bid is the lowest. The listing company charges a nominal sum for its services. This the haulage contractor is glad to pay.

If such listing concerns are feasible in England, they must also be feasible in America. Of course, the greater area of this country as compared with England would necessitate the formation of separate companies in each of the large cities. Each of these concerns would list shipments to be delivered within certain areas or zones.

The Winter Truck

THE more you conserve the efficiency of a commercial vehicle driver the more work it is possible to have him perform and the higher is his percentage of efficiency. A driver comfortable in winter is in better condition to care for a truck and drive it with more care than a half-frozen one.

Carry the thought a step further: In many cities, such as Minneapolis, where the temperature sometimes remains well below zero for a week at a time, it is highly desirable that the driver be given every attention. Use a little of the exhaust to heat the cab.

Turning to the truck: Why not prepare it a little better for the continuous cold of winter? Trucks suffer from motors getting too cold; the radiator capacity which is computed to be adequate for the hottest August day is too large for winter. Why not use a triple-section radiator, one in which perhaps one-third or, if necessary, one-half or two-thirds, could be readily cut out of the system, drained, and thus aid in keeping the motor temperature where it should be? Such a device is needed. It would not be difficult to design. Many forms of tubular radiators could with little outlay be quickly transformed. The result would be more satisfactory motors and greater fuel economy.

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Mired at 5 a. m., 1 mile out of Fallon, Mont.

G.M.C. Makes Overland Trip—Seattle to Gotham

Carries Full Load 3,710 Miles Under Its Own Power

REMINISCENT of the days of the famous cross-country run of the Alco, the 1½-ton G. M. C. truck shown on this page has just completed a trip across the continent from Seattle, Wash., to New York City. The vehicle, which made the trip under the auspices of the Seattle Chamber of Commerce, carried a full load the entire route and covered every mile of the run under its own power.

The purpose of the trip was to test the National Parks Highway leading out of Seattle and to prove that the roads and bridges along the route to New York City were passable in the summer season for passenger car touring between the two cities. The truck amply proved it, yet it encountered considerable bad going, and in the mountains of Washington and Idaho met with narrow bridges, washouts and floods which tested the skill of the driver.

The truck left Seattle on July 12, and arrived in New York City on Tuesday morning, Sept. 19. This is an elapsed time of 69 days, in which a total mileage of 3,710 was covered. The truck was equipped with a Recordograph, which registered the stops and the running time. This showed the actual running time to average 31 days of 14 hr. each. No driving was done on Sundays, except toward the end of the trip, when it was desired to make up time lost which had been caused by delays due to floods during the first half of the trip.



On a good stretch of road in the Bitter Root mountains, 14 miles east of Wallace, Idaho

The route of the truck after leaving Seattle led through Spokane, Wash; Butte and Miles City, Mont.; Bismark and Fargo, N. D.; St. Paul, Minn.; La Crosse, Wis.; Chicago, Cleveland, Ohio, and thence through Buffalo, Rochester, Syracuse and Albany to New York City.

Carried Ton of Canned Milk

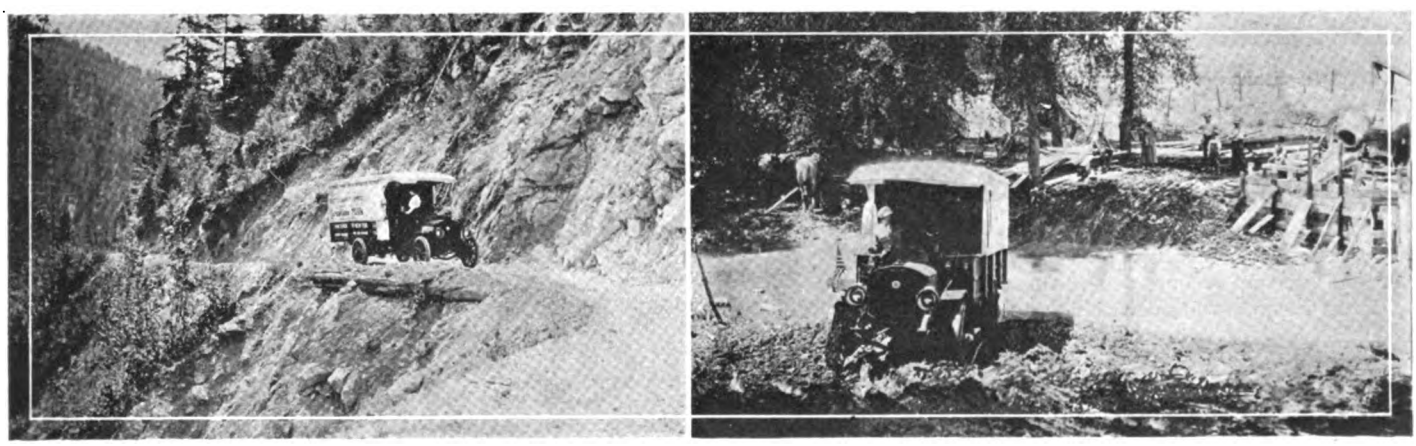
The truck was loaned to the Seattle Chamber of Commerce by the General Motors Truck Co., Pontiac, Mich., and carried as its load a ton of canned milk which was hauled as a freight shipment from the Washington manufacturer to one of his customers in New York City.

The vehicle was driven by William Warwick, accompanied by his wife. They had a complete set of cooking and camping utensils and paraphernalia. They slept in the truck or in lean-to camps for the entire trip and did not stop at any hotels with the exception of one in Cleveland, Ohio. Even this was not intended, but was forced upon them by Cleveland enthusiasts who motored out 30 miles to meet the truck coming into Cleveland and likewise gave it a similar send-off on leaving.

The truck, of the worm-driven type, experienced no mechanical trouble and required no adjustments except those on the carbureter due to changes in the altitude on the way across the continent. It was shod on Goodrich solid tires and averaged about 8 miles to the gallon of gasoline for the entire trip.

Negotiated Narrow Bridge

One of the most difficult tests to which the truck was put during the run was the crossing of a narrow plank bridge laid diagonally across a canyon in Blewett Pass, Wash. Due to the long wheelbase of the truck it was impossible for it to make the turn leading from the road along the canyon edge onto the bridge. It was finally negotiated by felling a large tree, oiling the bark, and laying it diagonally across the corner of the bridge on the inside of the turn going over. Then, by short spurts, the rim of the rear inside wheel against the oiled tree, the rear end was swung over sufficiently to make the turn. Getting off the bridge was accomplished in somewhat the same manner, by oiling the rock along the canyon road on the other side and swinging the rear end around by jamming the front outside wheel rim against the oiled rocks.



At the left, making a sharp turn in the Blewett Pass., Wash. At the right, fording a stream 10 miles east of Big Timber, Mont.

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Cleveland's $2 Wheel Tax Approved

Truck Fee Is $1 Additional for Each Ton Over 1 Ton

CLEVELAND, OHIO, Sept. 23—A wheel tax of $2 a year for all vehicles using Cleveland streets was approved by the City Council Committee on Streets yesterday. An amendment to the traffic rules prohibiting the use of iron tires on motor trucks and requiring rubber tires to be at least ¼ in. thick at the wheel flange was approved.

In addition to the wheel tax of $2 a year per vehicle of any kind, another tax of $1 per ton will be levied on all motor trucks whose capacity is in excess of 1 ton. While the new tax will undoubtedly be of value to Cleveland truck owners because it will raise additional money for the Cleveland streets, its principle is wrong. Horse wagons are not to be taxed on their capacity, neither are passenger cars. Why then should trucks be taxed according to their capacity?

BEECROFT TALKS TRUCKS IN SOUTH AMERICA

CLEVELAND, OHIO, Sept. 15—Over 75 per cent of the membership of the Cleveland section of the S. A. E. was present at the opening of the fall and winter season to-night, when David Beecroft, Directing Editor of THE COMMERCIAL VEHICLE, gave an illustrated talk on passenger car and motor truck conditions in South America. Over 100 lantern slides showing roads, motor vehicle salesrooms, garages, and country conditions in Argentine, Brazil and Uruguay, were shown. Many of the tire interests of Akron were represented, as were factories in Toledo and other outlying towns and cities.

CANADIANS HEAR ADVANTAGES OF GOOD ROADS

MONTREAL, QUE., Sept. 24—An instructive paper on good roads was read recently by J. Duchastel, president of the Dominion Good Roads Association, at the convention of the Canadian municipalities held in Montreal.

He pointed out that highways, the most universally-used means of communication and transportation, had both economic and social uses. Good roads, he said, would keep the young people on the farms, allow the schools to be filled summer and winter, encourage the farmers by better communication with the cities, lower the cost of living in the city and country, increase property values, bring motor vehicle tourists' traffic, and, by lessening dust, lessen disease.

Showing how the cost of haulage depended upon the state of the roads, he declared that the force that pulled only 800 lb. on a muddy earth road would draw from 5000 to 8000 lb. on a brick road. "The farmers of Canada," he said, "would save from $4,500,000 to $5,000,000 a year if the roads of Canada were as good as the roads of western Europe. To haul 1 ton 1 mile here, exclusive of the cost of labor, costs 15 cents more than in Europe." Among the suggestions he made was a Dominion law to fix the maximum grades of roads.

TO INVESTIGATE SAFETY DEVICES

NEW YORK CITY, Sept. 26—The Safety First Federation of America has appointed a Bureau of Standards which will investigate the merits of safety devices which may be submitted to it. The recommendations of the bureau, after its investigation of the device has been completed, will be submitted to the directors of the federation for approval and such devices as come up to the standard of the federation will be endorsed.

Darwin P. Kingsley, president of the New York Life Insurance Co., has been made chairman of the bureau and associated with him are Ernest P. Goodrich, E. E. Rittenhouse, Charles Bernheimer, William Guerin, George H. Robertson, Joseph Tracy and William Bondy. Wayne D. Heytecker has been appointed executive secretary of the association, succeeding Frederick H. Elliott, resigned.

N. A. C. C. COMMITTEES NAMED

NEW YORK CITY, Sept. 23—Following is the personnel of the various committees of the National Automobile Chamber of Commerce for the coming year:

Patents—Chairman, C. C. Hanch, Studebaker Corp.; William H. Van Dervoort, Moline Automobile Co.; Windsor T. White, White Co.; W. C. Leland, Cadillac Motor Car Co.; Howard E. Coffin, Hudson Motor Car Co.

Traffic—Chairman, William E. Metzger, Argo Electric; R. E. Olds, Reo Motor Car Co.; A. I. Philp, Dodge Bros.

Show—Chairman, George Pope; W. C. Leland, Cadillac Motor Car Co.

Legislative—Chairman, H. H. Rice; Waverley Co.; J. Walter Drake, Hupp Motor Car Co.; J. I. Farley, Auburn Automobile Co.

Electric Vehicle—Chairman, H. H. Rice, Waverley Co.; Fred R. White, Baker-R & L Co.; W. C. Anderson, Anderson Electric Car Co.

Commercial Vehicle—Chairman, Windsor T. White, White Co.; Alvan Macauley, Packard Motor Car Co.; H. Kerr Thomas, Pierce-Arrow Motor Car Co.; P. D. Wagoner, General Vehicle Co.; M. L. Pulcher, Federal Motor Truck Co.

Good Roads—Chairman, Roy D. Chapin, Hudson Motor Car Co.; W. E. Metzger, Argo Electric; C. C. Hanch, Studebaker Corp.

Hand Book—Chairman, Carl H. Pelton, Maxwell Motor Co.; A. I. Philp, Dodge Bros.; A. L. Riker, Locomobile.

Membership—Chairman, Wilfred C. Leland, Cadillac Motor Car Co.; Hugh Chalmers, Chalmers Motor Car Co.; C. W. Churchill, Winton Co.

Wisconsin Trucks Gain Twentyfold

Increase from 122 in 1909 to More than 2,000 in 1916

MADISON, WIS., Sept. 19—Motor trucks in the State of Wisconsin have increased from 122 in 1909 to approximately 2000 in 1916. This is an increase of 15 times the number in 1909, during a period of about 7 years. For over 4 years the number of trucks in use grew steadily, but slowly, the larger cities absorbing the greater share of the increase. During the last 3 years, however, Wisconsin has shown a remarkable increase in motor truck purchases, not alone in the cities, but in the outlying suburban cities and also in the rural country. The list of the makes of trucks registered in the state, exclusive of converted passenger cars, on Aug. 1, 1916, is as follows:

I. H. C.	232	Gramm	18
Buick	222	Vim	15
Stegemann	132	Commerce	11
Kisselkar	121	Monitor	10
Chase	117	Koehler	9
Overland	96	Schacht	9
Menominee	77	Kelly	8
Reo	72	Smith	8
Studebaker	70	Universal	8
Packard	66	Garford	7
Republic	53	Peerless	7
Sterling	49	Sampson	7
G. V.	16	Wisconsin	7
Jeffrey	44	Alco	6
Avery	43	Bessemer	6
White	36	Willys	6
Acme	32	Brown	5
Crown	25	Davis	5
Federal	25	G. M. C.	5
Johnson	24	Locomobile	5
Dart	23	Mack	5
Wilcox	23	Randolph	5
Pierce-Arrow	21		

57 miscellaneous makes, ranging from 1 to 4 trucks each to a total of 99.

SPICER MFG. CO. SOLD

NEW YORK CITY, Sept. 26—The Spicer Mfg. Co., Plainfield, N. J., one of the largest manufacturers of universals in the world, has been purchased by a banking syndicate headed by Merrill Lynch & Co., New York. The name of the company will not be changed, but will have $1,500,000 first preferred 8 per cent stock which is now offered at $100 per share, 500,000 second preferred and 5,000,000 common. The factory is being expanded and it is said that production for 1917 will be approximately 700,000 universals.

TRUCKS AT BROCKTON SHOW

BROCKTON, MASS., Sept. 23—Motor trucks will be featured among the exhibits at the motor vehicle show in connection with the Brockton Fair in October. A building costing $25,000 has been erected in which to house the motor show exclusively, and the Boston Automobile Dealers Assn. has sanctioned its members exhibiting there. Space has been secured by a number of the dealers already, among these being John L. Judd, Smith Form-a-Truck; John L. Bowman, Velie; Alvan T. Fuller, Packard; Joseph L. Donovan, Studebaker; Connell & McKone, Overland; Noyes-Buick Co., Buick; Beacon Motor Car Co., Peerless; Locomobile Co., Riker; J. W. Maguire, Pierce-Arrow; J. E. Cunningham, Republic.

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Gotham Ferry Rates Again Discussed

Railroads Give New Schedule—Increased Truck Fees

NEW YORK CITY, Sept. 26—After almost 2 years of argument, the question of the ferry rates for motor trucks and horse wagons between the lower end of Manhattan Island and the New Jersey cities opposite, has again come up in the form of a new compromise schedule offered by the railroads. The outstanding feature of the new proposed rates is that they are an increase of anywhere from 10 to 20 per cent over the former rates for both wagons and trucks. The original controversy arose over a claim of discrimination of rates against the motor truck. By the new schedule it would appear that the railroad's method of eliminating this discrimination has been to increase the rate for both types of vehicles.

Another feature of the proposed schedule is that a difference is made between loaded and empty horse wagons and trucks, notwithstanding the fact that each type occupies the same space on the ferry whether loaded or light. The railroads claim that the difference in rate is fair, due to the value of the service rendered and that it should be worth more to them to carry heavily loaded vehicles than empty ones.

The new proposed rates have not gone into effect, however, the combined legal committees of the Hudson County Team Owners' Assn., the New York Team Owners' Assn., the Merchants' Assn. of New York and the Motor Truck Club of America, Inc., having taken the necessary steps to have further discussion on the schedule before it is presented to the Interstate Commerce Commission. The Team Owners' Assn. claim that the rates are unfair because they are in excess of the former rates and because of the difference in charges for light and loaded vehicles, maintaining that as a light vehicle takes up the same room as a loaded one there should be no extra charge on the latter. The motor truck interests likewise base their claim as to unfairness on the increased rate and the extra charge for vehicles when loaded. They also claim that the additional charge of 5 cents for every 2 ft. or fraction thereof in the length of the truck over 11 ft. long is unfair, in that this rate is in excess of the rate charged for the first 11 ft.

It is said that the new rates proposed are in violation of the existing leases between the railroad companies and the City of New York, in that they are in excess of the tariffs laid down in those leases. There is liable to be considerable further discussion on the question before the matter is finally settled. In the meantime the old rates remain in force. The proposed rates are as follows:

HORSE-DRAWN VEHICLES

USED FOR THE TRANSPORTATION OF MILK, GOODS, MERCHANDISE OR OTHER FREIGHT, EXCEPT BREWERY GRAIN

Wagon or cart under 11 ft. in length:
- Light, with one horse and driver...15 cents
- Loaded, with one horse and driver.20 cents
- Light, with two horses and driver.25 cents
- Loaded, with two horses and driver.30 cents

Wagons or carts 11 ft. or over in length are charged for at truck rates.

Truck, van, dray, or skid under 15 ft. in length:
- Light, with one horse and driver..20 cents
- Loaded, with one horse and driver.25 cents
- Light, with two horses and driver.30 cents
- Loaded, with two horses and driver.40 cents
- Light, with three horses and driver.40 cents
- Loaded, with three horses and driver .....50 cents
- Light, with four horses and driver.50 cents
- Loaded, with four horses and driver .....60 cents

For each additional 2 ft. or fraction thereof in length, an additional charge is made of 5 cents for a light vehicle and 10 cents for a loaded vehicle.

For a vehicle with five or more horses the charge is 10 cents for each horse in excess of four horses, added to the charges above provided for a vehicle with four horses and driver.

Freight vehicles not otherwise classed are charged for at rates for trucks, vans, drays, or skids.

Each person in addition to the driver, regular fare.

MOTOR TRUCKS

USED FOR THE TRANSPORTATION OF MILK, GOODS, MERCHANDISE OR OTHER FREIGHT

Motorcycle and operator.....10 cents
Motor tricycle and operator.....15 cents
Motor truck under 11 ft. in length:
- Light, with operator.....25 cents
- Loaded, with operator.....30 cents

Motor trucks, 11 ft. and over in length, are charged for at motor truck rates.

Motor truck or van under 15 ft. in length:
- Light, with operator.....40 cents
- Loaded, with operator.....50 cents

For each additional 2 ft. or fraction thereof in length, an additional charge is made of 5 cents for a light vehicle and 10 cents for a loaded vehicle.

Each person in addition to the operator, regular fare.

NEW GOODYEAR SALES PLAN

NEW YORK CITY, Sept. 26 — The Goodyear Tire & Rubber Co. will put into effect Oct. 1 a new plan for the retailing of its tires. The number of dealers will be reduced about 66 per cent and those that remain will be required to be of a high grade from a business standpoint. All price lists will be withdrawn Oct. 1 and the new plan will be instituted at once. Dealers, under the new system, must have service stations as well. They must carry an adequate stock of tires, tubes and accessories and must be in position to give to the public the service to which Goodyear considers the public is entitled.

There will be no change of consequence in price. Tires will be sold, as heretofore, on the consumer's list while the dealer's price will be based upon what has become known as the pink list. No requirements as to price maintenance will be made.

It is estimated that there are now in the United States 25,000 or 30,000 Goodyear dealers, and it is also estimated that under the new plan there will be only about 10,000. The plan has been operating partially in Chicago, Kansas City, St. Louis, Boston and New York for several weeks.

The present list has not yet been withdrawn in these cities, but the placing of service dealers has been begun. While the Goodyear move is radical among large tire producers, it is not entirely new with Goodyear, for its cord tire has been handled on this basis. Because the cord tire was a new type and a comparatively expensive article, it was required that the dealer maintain certain stock and be equipped to take care of his trade.

The new contracts with dealers will not give exclusive territory, although one of the company's executives states that in towns of a reasonably small population there might not be more than a single dealer, still he would not be given an exclusive territory, the company reserving the right to sell there if it should choose. In fact, one dealer might be placed next door to another.

Postal Motorization Is Begun in Earnest

Forty-six Trucks Bought for Work in Three Cities

NEW YORK CITY, Sept. 27—The work of motorizing the delivery equipment of the Post Office Department by government-owned-and-operated trucks has begun in earnest. The work is in the hands of two committees of three men each. The first, headed by Frank Galbraith, Chicago, and Messrs. Simmons and Phalan of Minneapolis and New York respectively, makes a study of the equipment of the various cities and decides which shall be motorized first and the order in which it shall be done.

The recommendations of this committee are then passed on to the second committee. This is headed by Charles Stearn, chairman, F. B. Clark and J. A. Rundle, master mechanic. These men decide the number and the types of vehicles necessary to best carry on the work.

So far the cities of Pittsburgh, Pa., Atlantic City, N. J., and Nashville, Tenn., have been studied and trucks bought for the work in those localities.

Eighteen Fords, ten ¾-ton Whites and three 1½-ton Packards have been purchased for service in Pittsburgh. Twelve Fords have been bought for use in Atlantic City and three ¾-ton Whites for the work in Nashville. In addition a new garage site having 40,000 sq. ft. of area has been selected in Philadelphia and a similar garage site in Detroit.

The two committees mentioned above will travel from city to city in their work of investigating the present equipment and determining the motor vehicles required to replace it. They are now about to begin their study in Boston, Mass.

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Signal and Commerce Abandon Merger

Commerce Doubles Stock. Will Make 1-tonner at $1175

DETROIT, MICH., Sept. 19—The merging of the Signal Motor Truck Co. and the Commerce Motor Truck Co. under the name of the Signal Commerce Motor Truck Co., has been abandoned. It had been the plan to take over the two properties and incorporate under New York state laws with a capital stock of 600,000 shares of no par value. Thomas Neal, president of the Signal concern and one time head of General Motors Co., was to have been president of the merged company, and W. E. Parker, president of the Commerce Co., was to have been vice-president of the organization. The two motor truck manufacturing concerns involved in the negotiations will revert to their original individual identities and each will continue to operate separately as heretofore.

COMMERCE TRUCK EXPANDS

DETROIT, MICH., Sept. 27—The Commerce Motor Car Co. has increased its capital stock from $200,000 to $400,000. Of this, $100,000 is subscribed for by present stockholders. The company is bringing out a new 1-ton truck, of which 3000 are to be built during the fiscal year. The price is $1,175 for the chassis with seat. There will also be made 1800 ¾-ton trucks. An addition 250 by 60 ft. is being added to the plant.

HYDRAULIC STEEL TO EXPAND

CLEVELAND, OHIO, Sept. 16—The Hydraulic Pressed Steel Co., this city, has issued $1,000,000 of 7 per cent cumulative preferred stock, which has been purchased by Borton & Borton. J. H. Foster, vice-president and general manager of the company, states that the new capital will be used in extending and developing the company's business, it being proposed to retire the present preferred issue of $200,000, which is callable at 102½. A sinking fund will be established Jan. 1, 1917, and each year thereafter $50,000 worth of the new stock will be retired. The stock will be callable at 107½.

Total net assets of the company will show an excess of three times the new preferred stock issue and the net quick assets about one and one-half times. The earnings of the company for the past 2 years have averaged four times the dividend requirements of the new preferred issue.

METROPOLITAN MOTORS GETS PLANT

NEW YORK CITY, Sept. 16—The Metropolitan Motors, Inc., a new concern formed to bring out a ½-tonner at about $695, has secured its plant at 585-587 Jackson Avenue, Bronx Borough, New York City. It is a two-story building and has been equipped with special shafting, pulleys, motor crane and other machinery for the manufacture of the new trucks.

As announced in the Sept. 1, 1916, issue of THE COMMERCIAL VEHICLE, the Metropolitan Motors company took over the business of the White Star Motor & Engineering Co., in the same city. The company is headed by W. C. Mack, one of the Mack brothers who started the Mack truck.

FULLER OUTPUT $700,000

KALAMAZOO, MICH., Sept. 12—This has been the biggest year in the history of the Fuller & Sons Mfg. Co. The value of the output of motor vehicle parts for the fiscal year 1916 as given by the officials is $700,000, as compared with $225,000 in 1915 and $75,000 in 1914. The working force, which was about fifty men in 1915, ran up to 225, and even 250 at times, during the present year. By 1918 the concern expects to have a new plant of more than twice the size of its present premises.



The photographs from which the illustration above and that on the opposite page were made were the first to be passed by the British censor to reach this country. They depict still another new use of motor trucks—the burial of the bodies of the commander and crew of the Zeppelin brought down outside of London by Lieut. Robinson in his aeroplane

Gramm-Bernstein to Re-organize

Capital Increased to 4 Million —New Officers and Name

LIMA, OHIO., Sept. 23—The Gramm-Bernstein Co., this city, has been reorganized, its capital stock increased to $4,000,000, and the new company has been incorporated under the name of the Gramm-Bernstein Motor Truck Co. Officers of the new company are: M. Bernstein, president and treasurer; B. A. Gramm, vice-president and general manager; H. O. Bentley, secretary and legal advisor; and R. H. Spear, director of sales. The board of directors consists of Messrs. Bernstein, Gramm and Bentley and two New York bankers whose names will be announced later.

The $4,000,000 stock of the new company is made up of $3,000,000 in common and $1,000,000 in preferred, the par value of all shares being $10. The subscription will be handled by Walston H. Brown & Bro., New York City.

WAUKESHA TO BUILD

WAUKESHA, WIS., Sept. 16—The Waukesha Motor Co., Waukesha, Wis., manufacturer of passenger car, truck and tractor motors, has increased its capital stock from $200,000 to $1,000,000 to provide for extensions to its plant. Work on a new office building is now under way, and plans are being prepared for large extensions of the machine shop, assembly department, and testing shop. The company has been obliged to decline acceptance of numerous large orders for engines because its facilities already are being pushed to the utmost by the orders now being executed.

STEARNS TRUCK DISCONTINUED

CLEVELAND, OHIO, Sept. 16—The F. B. Stearns Co. of this city, which offered a 5-ton, chain-driven motor truck, equipped with a Knight motor, during the first half of 1916, has discontinued its manufacture of trucks and is now bending all its energies toward the manufacture of passenger cars exclusively.

HANGER TRUCKS DROPPED

CLEVELAND, OHIO, Sept. 16—The Hanger 1000-lb. worm-driven truck, manufactured by the C. F. Hanger Co. of this city, has been discontinued. The Hanger truck was first brought out in 1915 and was an assembled product sold principally in Cuyahoga County, Ohio.

FOSTORIA LIGHT CAR BANKRUPT

TOLEDO, OHIO, Sept. 22—The Fostoria Light Car Co. has filed a voluntary petition in bankruptcy. Liabilities are given as $223,387.42 and assets, consisting of real estate, machinery and materials, at $398,768.44.

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Freight Car Shortage N. A. C. C. Study

Body Confers with Railroads to Keep Cars in Motion

NEW YORK CITY, Sept. 26—A committee of four traffic managers, consisting of: H. R. Moule, Chalmers, chairman; H. Higginbottom, Dodge; H. M. Newlin, Maxwell, and C. V. Eggers, Willys-Overland, has been formed to co-operate and confer closely with the Traffic Department of the National Automobile Chamber of Commerce on the question of freight car supply, and the department will put into effect any action that may be helpful.

A committee of five railroad operating men has also been appointed, consisting of: C. H. Bieber, Michigan Central, chairman; H. J. Merrick, New York Central; C. B. Strohm, Santa Fe; J. W. Roberts, Pennsylvania Lines, and E. E. Betts, Chicago & Northwestern, to give the handling of automobile equipment special thought and co-operate with the chamber in proper supervision of the cars.

The N. A. C. C. has notified its members that car balances of the American Railway Assn. show a net shortage of 14,281 freight cars. This is the lowest supply ever reported at this time of the year, when there is usually quite a surplus of cars. A year ago this surplus was 264,243 cars, notwithstanding which a serious car shortage was experienced during the months immediately following.

Members are told this condition indicates that each freight car must be made to perform maximum service and it is urgently recommended that incoming freight at the factories be unloaded promptly and not be permitted to accumulate; also that shipments of motor vehicles to dealers should be unloaded immediately upon arrival, inasmuch as such shipments are in the special automobile cars, which will be the first to feel the shortage of equipment.

FOUR DRIVE CAPITAL, $200,00

BIG RAPIDS, MICH., Sept. 20—At a meeting of the stockholders of the Four Drive Tractor Co., it was voted to increase the capital stock of the company from $50,000 to $200,000. The stock will be offered to the present stockholders during a period of 10 days at the par value of $10 per share.

HOUGHTON TO MAKE 500 AMBULANCES IN 1917

MARION, OHIO, Sept. 20—The Houghton Motor Co. of this city plans to build 500 ambulances and hearses during the coming year. Fifty of the vehicles are to be delivered by Jan. 1, 1917. All are to be delivered by Oct. 1, 1917. The concern has been devoting the past year to experimental work and the vehicles to be turned out are now satisfactory.

KELSEY WHEEL TO ADD

DETROIT, MICH., Sept. 25—Two additions, both 140 by 600 ft., to the plant of the Kelsey Wheel Co. will be started in a few days and when completed they will provide at least 50 per cent more manufacturing room. The working force, which now totals about 2000 men, will be increased to start with by 500 to 600 men and eventually by 1000.

"Our business has never been better," said an official of the Kelsey company to-day. "The general outlook for the motor vehicle business is exceedingly good, and the general increase during the present year is only a forerunner of a much bigger business in 1917."

OVERLAND GETS NEW GOTHAM SALESROOM

NEW YORK CITY, Sept. 15—The Willys-Overland Co., which recently took control of its sales in this city by the establishment of temporary quarters at Columbus Circle, has leased the property at Broadway and Fiftieth Street belonging to the Wendell estate. This building has remained vacant for 14 years. The Overland company will be the first tenant, and will occupy the entire three floors and basement. The company has also opened a used-car department at 1700 Broadway, near Fifty-fourth Street.

STEWART-WARNER DIVIDEND

CHICAGO, ILL., Sept. 15—The Stewart-Warner Speedometer Co. has declared the regular quarterly dividend of 1½ per cent on the common stock.

The corporation reports for the 6 months ending June 30 last net profits of $1,275,000, a new high record. The net profits in the last quarter totaled $703,254, against $571,873 in the first quarter of the calendar year.

The balance sheet shows assets as follows: Real estate, buildings, machinery, etc., less depreciation, $1,720,774; patents, trade marks, and good will, $9,096,967; inventories and receivables, $3,454,008; deferred charges, $154,158; total assets, $14,425,908.

Liabilities: Preferred stock, $724,400; common stock, $10,000,000; current liabilities, $420,317; surplus $3,281,191. Surplus includes $307,463 set aside to retire the preferred stock.

Kelly Truck Plans A Big Expansion

Will Reduce Capital and Issue 2 Millions New Stock

SPRINGFIELD, OHIO., Sept. 27—A special meeting of the stockholders of the Kelly-Springfield Motor Truck Co., this city, will be held Oct. 10 to increase the common stock of the company to $2,000,000. Preparatory to this step the company has decreased its capital from $2,500,000 to $1,914,000 in accordance with the requirements of the laws of Ohio that a company cannot increase its stock unless all its original capital stock has been subscribed. The increase is to provide for the rapidly expanding business of the company.

The preferred stock of the Kelly-Springfield company is $1,014,000, the outstanding common since the reduction being $900,000. The common was originally $1,000,000.

A few days after the stockholders' meeting the directors of the company will meet to determine the amount, if any, of the new common stock to be issued.

HENCH & DRONGOLD TO MAKE TRUCK BODIES

YORK, PA., Sept. 16—The Hench & Drongold Co., this city, large manufacturer of garden implements, has entered the truck field as a maker of truck bodies and parts of both wood and metal. The company will also build special machinery and do machine and forge work. Special equipment has been installed in the company's large new plant, which covers about 6 acres.



The funeral took place at Potter's Bar. The coffins were brought from the little church at Cuffley on a motor truck and trailer belonging to the Royal Flying Corps

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British Armored Trucks of Track-laying Type

WAR has already proved a great impetus for the increased sale of the conventional motor truck. Likewise, the sensational reports emanating from the Somme front regarding the work of the new British armored motor trucks is liable to prove a great impetus for the increased sale of trucks of the track-laying or caterpillar type.

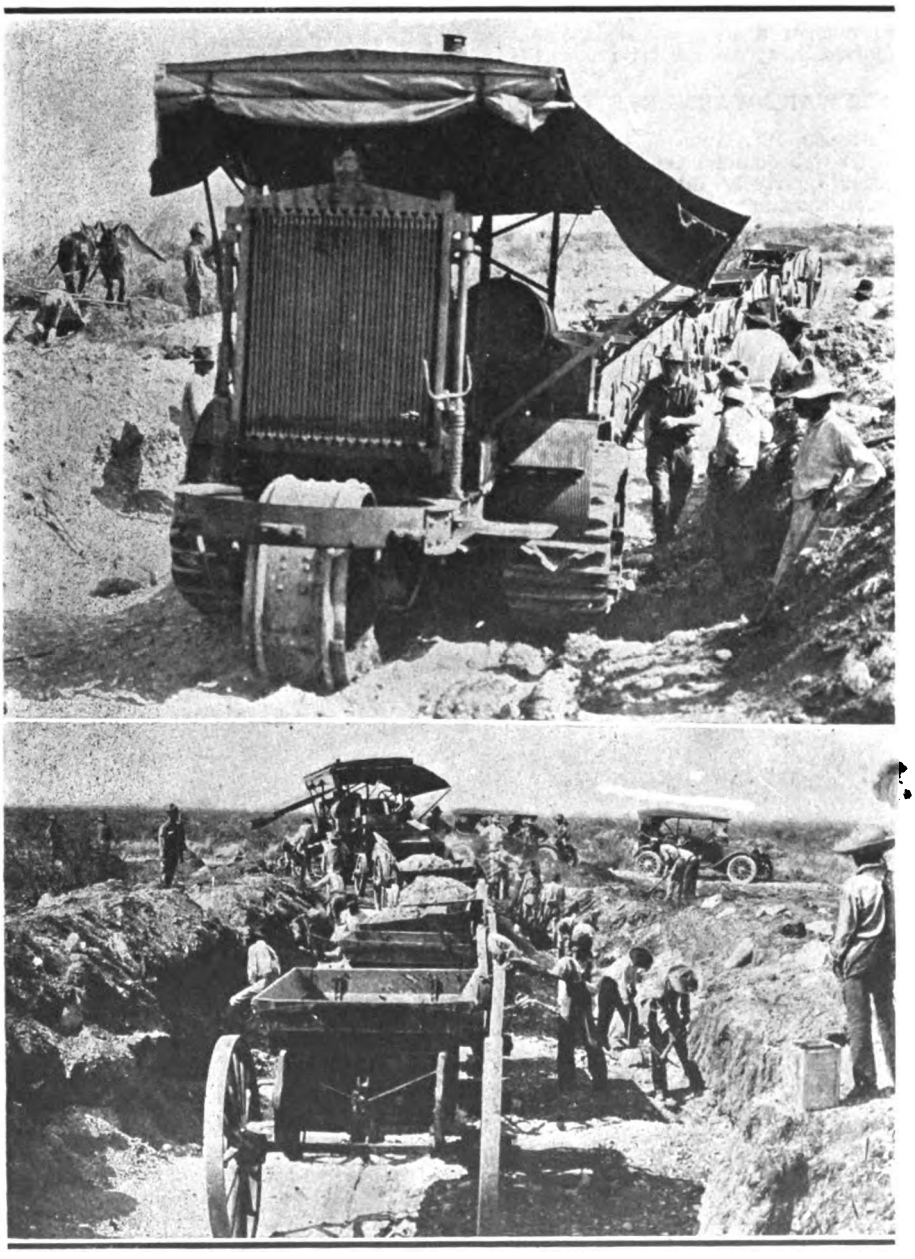
The great work which trucks of the ordinary type have already accomplished on the battlefields of Europe has brought them into the limelight attention of the world at large. Thousands of concerns engaged in purely commercial pursuits have decided that if trucks were the best means of transportation for armies, they were also best for regulation haulage. The sales of trucks in the United States so far this year are far ahead of the estimated production of Jan. 1.

Similarly, the work which the new British armored trucks are doing along the Somme is liable to make for an increased and more general use of these track-laying vehicles for other than war purposes. Heretofore they have been used in this country principally for agricultural purposes, although there are several such makes designed as trucks for ordinary haulage over the roads. Perhaps the work of negotiating German trenches will eventually lead to the greater development of vehicles of this type for regular haulage of all kinds of goods where high speed is not required. The trend in transportation haulage is to increase the unit loads hauled. The track-laying trucks have a great tractive ability, besides being able to negotiate even the worst of roads.

Due to the vigilance of the British censor it is impossible for us to give the details of the vehicles used or to show illustrations of them, although the picture on this page depicts what a similar vehicle is doing for Uncle Sam on the Mexican border.

It is known that the Holt Mfg. Co., Peoria, Ill., has delivered 1000 of its Holt caterpillar tractors to the British Government, and it is thought that it is some of these which have been fitted with armored bodies that are now in service along the British front. It is also known that quite a large number of Lombard track-laying vehicles, made by the Lombard Auto Tractor Truck Co., New York City, have been delivered to the British authorities.

In the usual type of vehicle two track-laying devices are used at the rear, with either one or two steel wheels at the front for steering purposes. Due to a lack of confirmation of rumors, it is not known whether this construction has been followed or whether a third track-laying wheel has been used at the front. Some rumors are to the effect that the latter construction has been adhered to, the forward track-laying unit propelling the vehicle and the two rear ones supporting its body.



The above illustrations depict a Holt caterpillar used by the United States Army at the American expeditionary base at El Valle, Mexico. The vehicle is engaged in hauling gravel from pits in several bottom-dump wagon trailers. This gravel is to be used in building roads to enable the conventional motor truck trains to reach the expeditionary base from this side of the border. The various angles at which the trailers are inclined in the above views indicate the uneven surface which the caterpillar can negotiate

The Jevne Truck Fleet

(*Continued from page* 9)

temporary result would be that she would be pleased at having forced us to break the rule. The permanent result would be that we would have educated her into a concession seeker. She would increase her demands from time to time until we would have to refuse. Then we would have gone back on our own precedent and might lose her good will. It is better to educate her from the start to the fact that our rules are necessary and inflexible. It is always necessary to keep the delivery system and every other feature of the business under control.

Another inside viewpoint from Jevne's is this: "Large merchants got an advantage when trucks were new. The whole delivery scheme has been speeded up, resulting in that enlargement of territory which gives greater scope for business."

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An improvised Autocar bus starting on one of its trips from the lower east side with as many passengers as can climb aboard. Buses of this type did a thriving business with fares at 10 cents a head

Trucks Salvation of Trolleyless Gothamites

More Than Thousand Turn Buses to Serve Public at Good Prices

MOTOR trucks have proved the salvation of many thousands of foot-sore New Yorkers and residents of its nearby suburbs who have been deprived of all street car facilities since the beginning of the present traction strike. While the operating heads of the street car companies and the organizers of the unions have agreed to disagree the poor Gothamites have been forced to walk unless they happened to be so fortunate as to live at points reached by the subway or elevated system. Likewise those of the suburbanites who could not reach their railroad depots except by trolley have been forced to walk, pay exorbitant taxicab fees or else make use of the thousand or more motor trucks which overnight were turned into all manner of buses to serve the public in the time of its need.

No Trolleys in Gotham at Night

True, these make-shift buses, most of them taken from other pursuits in search of a more lucrative business, have been run to make money and to make it while the sun shone. They have served the public and served it well. How well, may be realized when it is known that for almost 3 weeks the number of street cars that have been run on the streets of New York after sun-down can almost be counted on the fingers of two hands!

This paralyzing of the street car traffic has fallen hardest on the poorer residents of New York's lower East Side, who cannot afford taxicabs, even in an emergency, much less as a steady twice-a-day tonic for 3 weeks. Many of these people go to work with the rising of the sun and are not ready to return to their homes until it has again set in the West—both times at which the streets were empty of the clanging street car. To these citizens the motor trucks quickly turned into buses, some with seats and some without, have been a blessing. They got them to their work and back even when the power of the mayor of the country's largest metropolis and the austere members of the Public Service Commission were unable to accomplish it.

What might have happened to the inhabitants of old Father Knickerbocker's city if the strike of the subway and elevated employes had been successful is only problematical. Yet it is safe to say that if the motor truck was able to save the day in the street car strike, it also would have done likewise if the other means of transportation had been suspended. There are more than 12,000 motor trucks of all kinds, types and sizes in Gotham. It is certain that a sufficient number of this aggregate could have been rushed into the passenger-carrying service to at least relieve the situation temporarily.

Large Concerns Used Own Trucks

In addition to those trucks which entered the bus service merely to make money for their owners, many of the large corporations like the New York Telephone Co., many of the larger manufacturing concerns and even banks, have turned some of their trucks into buses to carry their own workers to and from their homes. Doctors and all sort of professional men who previously found the traction facilities sufficient to serve them have been forced to buy passenger cars to enable them to carry on their business without serious interruption. Passenger cars have not been of much advantage to the general public, however, because of their small passenger-carrying capacity as compared with the larger motor trucks. Some of the latter carried as many as 30 persons at one time.

Trucks of Great Economic Value

The motor truck has saved many a supper from becoming cold in the homes of the Manhattan, Bronx and Brooklyn cliff-dwellers. It has saved many thousands of dollars of shoe leather, which would have otherwise been worn out on the city's hard sidewalks. And what is more important, it has saved many thousands of dollars of work for both employe and employer. Furthermore, it is gratifying to know that it will continue to serve the public until the strike is finally settled.

If the New Yorker has been well served by the motor truck, the residents of Yonkers, Mount Vernon, Pelham, New Rochelle, outlying parts of Queens and

(*Continued on page* 25)



It was the poorer classes of the lower portions of New York which were hardest hit by the strike of the street car motormen and conductors. The above view depicts a typical emergency bus and how the women passengers got aboard to sit on soap boxes or the body sideboards

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1—*Loaded ammunition trailer being hauled through dense forest to the rear of the French front by means of motor tractor. Note the soft condition of the road and the long tow rope employed*

French Guns Hauled by Tractor



2—*A four-wheel-driven tractor hauling one of the heavy pieces of French artillery to a concealed forest position. Note the ruts which the tractor has made in the soft road*

3—*Another view showing the difficulties encountered in getting the ammunition to the guns in their forest hiding places where they can escape the eyes of enemy aeroplanes*



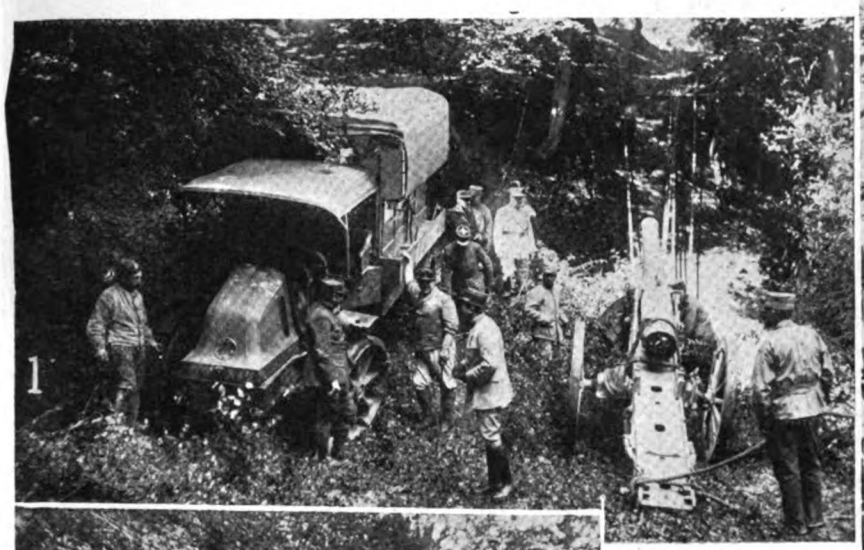
4—*A Latil four-wheel-driven tractor hauling one of the heavy French pieces up a sharp grade in open country*

5—*Another view of the tractor and heavy field piece about to be pulled over a ridge. Note the vertical winch on the tractor*



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Motors Increase Rifle Mobility

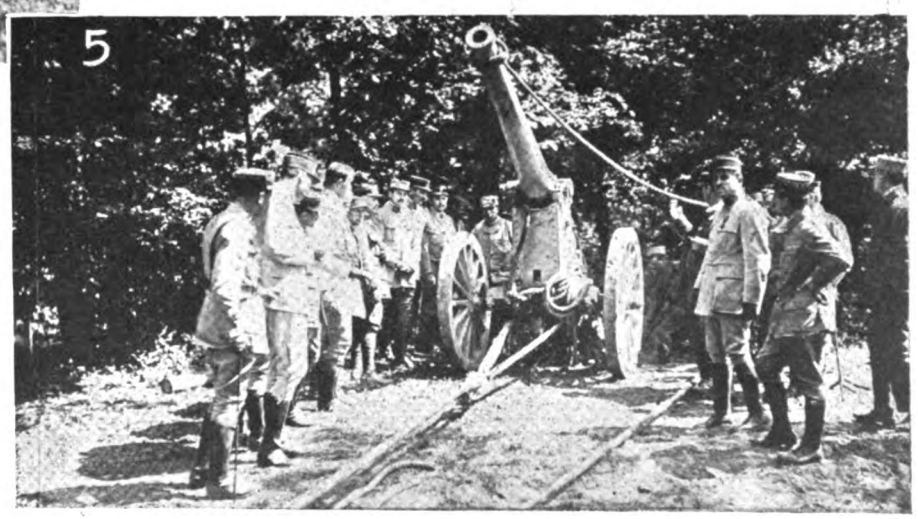




3—*Up she goes on a rope pulled by the tractor winch*







1—*In the dense forest. Starting to pull the rifle up a steep hill.*

2—*The second stage of the operation shown in No.* 1—*the gun almost over the ridge*

4—*Sticking her nose over the top of the bank. Note the steadying guy rope*

5—*Up on level ground and ready to be set in position to fire*

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Opportunity Beckons the American Motor Truck in South America's Large Expanses

Part V

The Mammoth Interior Coffee Plantations of Brazil Offer Large Truck Market—City of Sao Paulo Progressive and in Need of Motors

By David Beecroft

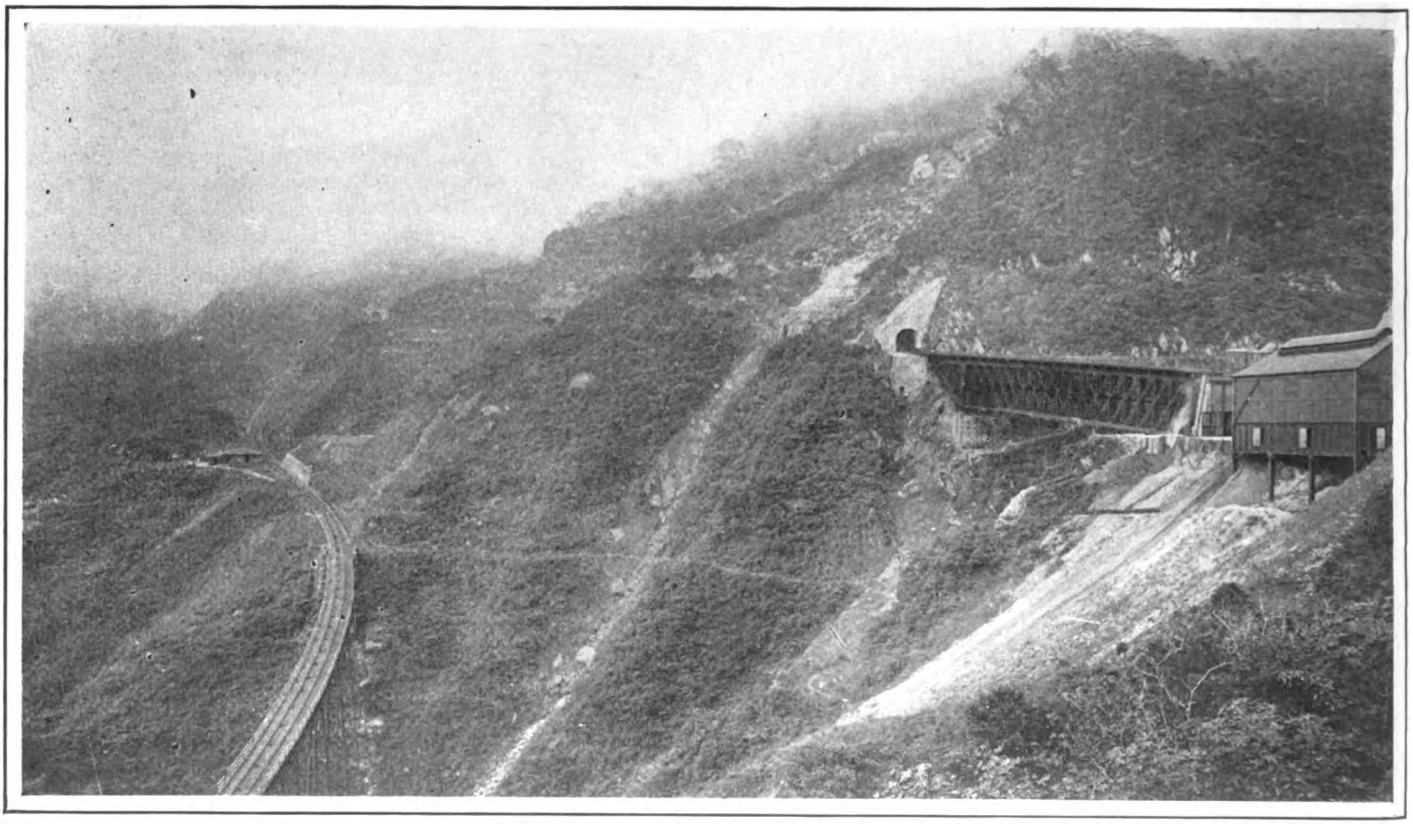
THE coffee plantations of Brazil offer the greatest field in Brazil to-day for the use of U.S.A. motor trucks. To this can be added the city of Sao Paulo, located right in the midst of the coffee lands and noted as one of the best business cities in Brazil. The entire State of Sao Paulo, which in area is as large as all of our six New England States with New Jersey added, is one of the finest sections of South America. You cannot find a higher type of business standards. The men are good business men. They are ambitious and operate along modern lines.

The people of Sao Paulo are white. Compared with other parts of Brazil, there is very little colored blood in the state. Practically all labor on the coffee plantations is white labor, imported from all of the nations of Europe. For years the government of the State of Sao Paulo held out special inducements to European emigrants and financial assistance was generously given to bring in a desirable class of workmen. This merely indicates the modern business mind of the Sao Paulo business man and coffee planter.

Coffee Planters Good Spenders

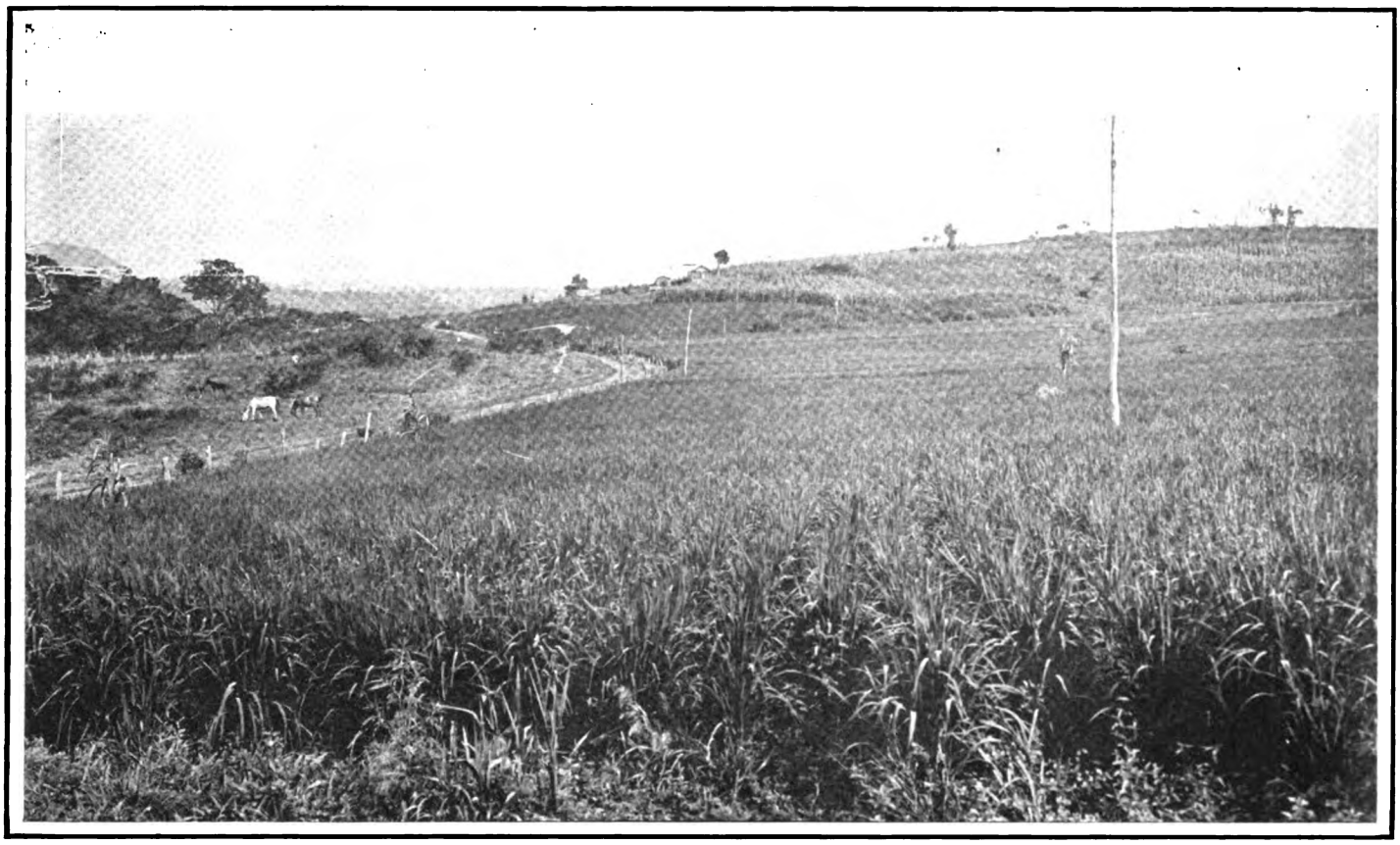
Coffee planters have the reputation of being good spenders. That characteristic seems to have been in their blood before they became coffee planters. The coffee industry is largely in the hands of natives of the State rather than controlled by foreign capital, as is so often the case with railroads, telephone and telegraph systems, water works, trolley lines and other utilities.

The particular class controlling the coffee industry are known as Paulistas. These Paulistas are descendants of a race who traveled much through all the central parts of South America in search of minerals. They were a hardy race, fond of adventure, and, like all people with a fondness for travel, were bound to be progressive. It is unquestionably this characteristic that accounts for much of the good, sound business connected with the coffee industry and the State



This shows a view of the celebrated Santos-Sao Paulo railroad, one of the richest railroads in South America. Over this railroad the whole of the coffee from the State of Sao Paulo is carried to the port of Santos, where it is shipped to the four corners of the world. The railroad to the left is a competing line that is at present under construction. The Santos-Sao Paulo road, shown at the top, and to the right is a fine piece of engineering. It makes an ascent of 2700 feet in 7 miles. This is possible by a cable system which takes three cars up at a time, balancing them by three cars going down the grade. The ascent is divided into five divisions, each having a cable system of its own. The railroad, with its many tunnels alternating with viaducts over gorges, gives some idea of the trouble experienced in building the new motor road from Santos to Sao Paulo, completed early this year. Since this motor road was completed it is possible to drive from Sao Paulo to Santos in a few hours. There is bound to be more or less truck traffic over this new thoroughfare

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General view in State of Sao Paulo showing sugar cane cultivation which is carried on extensively in several parts of the state. To the left is seen a typical road over which motor cars and trucks will have to run. The roads in the coffee growing section of the state are similar to the one shown above. They are generally private roads through plantations

of Sao Paulo. They are good people to sell trucks to.

They are far above the Brazilian average. The very nature of coffee-growing brings them more or less into touch with transportation and machinery, so that they are readily inclined to look upon the motor truck as a good investment rather than an expense or an experiment. It would be hard to find a better class of people on whom to work in the selling of motor transportation.

15 Million Sacks Average Crop

Last issue we referred briefly to the volume of the coffee industry. A few figures may be repeated. There are in the State of Sao Paulo approximately 700,000,000 coffee bushes. These yield approximately an average crop of 15,000,000 sacks of coffee. Sometimes the crop goes as high as 17,000,000 sacks and sometimes it falls much lower. A sack weighs 132 lb. In Brazilian language it is 60 kg. All coffee leaving the state goes in these 132-lb. sacks, and when the coffee is loaded on ships it is carried in these same sacks. The sack is the unit of coffee handling. When you sell the crop the sack is the unit. When you arrange for shipping it you pay freight according to the number of sacks. When you transport coffee on motor trucks it is carried in these 132-lb. sacks.

The total crop of coffee averages very close to 1,000,000 tons. This coffee is transported three different times either by horse or motor truck.

How Coffee Is Handled

1. It is first transported from the plantation to the home of the planter. This may be several miles, depending on the area of the plantation. Coffee planting is not carried on in small farms as we grow wheat in Minnesota or Kansas. Rather, it is grown on the big land system. A plantation will have 15,000 coffee bushes and more than 100 laborers will be needed to care for the bushes, pick the coffee and do the work in general. Thus, a plantation is a large institution, one well qualified to have motor cars and perhaps several motor trucks.

2. From the home of the planter the coffee has to be transported to the railroad depot. This may be ½ mile or it may be 7 or 8 miles. It is just the same as in all other countries. You cannot have every plantation close to the depot. To-day horses are used to transport the coffee. There are several plantations using motor trucks. Here is a good field for motor trucks, as well as using them for all kinds of work on the plantation. There is plenty of work on several plantations to keep several trucks working all the year round. Hauling the coffee from the field to the home of the planter and then to the depot is only a small part of the work for which our trucks can be used.

3. Lastly, in the Port of Santos the coffee is transported from the railroad depot to the warehouses, where it is cleaned and re-sacked for ocean shipment. We mentioned in the last issue that no more trucks are needed for this work.

Truck Education Required

One of the great objections that will be raised to the more general use of motor trucks in the coffee industry will be the argument that horse labor is very cheap as compared with motor trucks. Many planters will be able to show in figures what it costs to haul the coffee by horse as compared with motor truck. All of this is quite true, but, in spite of all, these men have yet to learn of the many economies of motor trucks. They are not schooled in the better use of trucks. They merely look upon the truck as a substitute for horse labor. The grade of horse used in Brazil is very inferior to that in U. S. A., and undoubtedly the planters will not be slow to see that in the long run the motor truck is an investment rather than an expense or an experiment.

The motor truck is not new in the coffee districts, but it is there in relatively small numbers. You see large French, English and German trucks.

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You see many streets like this in the towns and cities of the coffee areas in the State of Sao Paulo. This is a residential street in the city of Ribeirao Preto, a city of 25,000 in the heart of the coffee country. The streets are well paved, and everything is very clean. This city is distinguished as being the home of Santos Dumont, the Brazilian aviation hero. The city is destined to be a big coffee growing center. Recently the Ford dealer opened a selling branch there

Generally large-capacity vehicles are used of 5 tons' capacity, or higher. You frequently see these large trucks being overhauled in the garages of Sao Paulo.

The lack of good roads will be advanced as a reason for not using motor trucks in the coffee areas. It is true that roads to-day are poor, but they are not too poor to admit of truck use. The land is rolling, as the illustrations on this and the following pages show. It is easily drained, and roads never get water-soaked as they do in level countries. The soil is a red earth.

Roads Good in Dry Season

In the coffee country there is a distinctively wet and dry season. The wet season is the summer season, when the growth takes place. In the dry season there is no difficulty with roads. We were through all parts of the State in the dry season, and although roads were poor there were motor cars that were averaging 20 miles per hour for distances of over 350 miles. Roads cannot be so bad when one can make such averages.

One handicap in the road system is that most of the roads are private thoroughfares through the large plantations. There is no complete system of public highways as we have in the U. S. A. Because of this, when you make a trip in a motor car across the country you are constantly bothered opening and closing gates which admit you to different plantations. You often have one such gate every 3 or 4 miles. These gates are often padlocked and you must get permission to proceed from the owner before it swings open to admit you. While this gate situation proves a handicap to ordinary motor traffic, it would not so seriously impede truck travel, as a truck may be working for weeks and months entirely within the plantation of its owner.

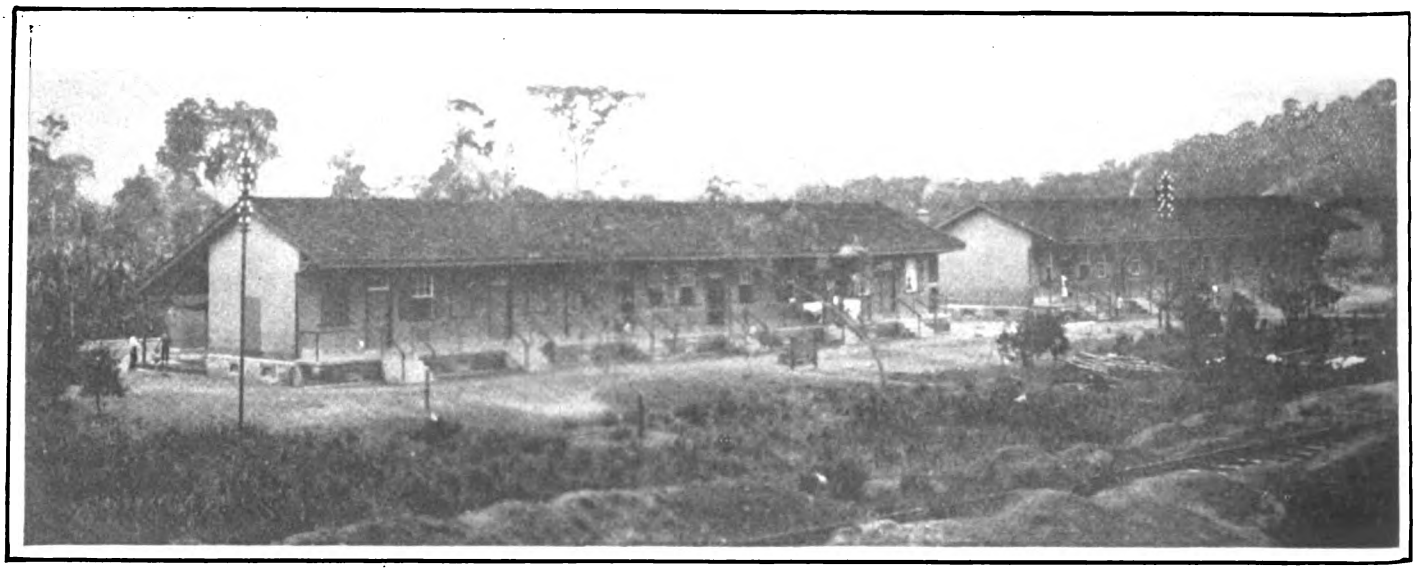
Good Roads Will Come

Already there is a growing spirit favoring throwing these private roads open to the public. The motor car is stimulating this movement, and it is certain that in a few years the State of Sao Paulo will have its system of improved public roads the same as we have in Illinois or New Jersey. Just as the motor car resulted in new road-building movements in our own Mississippi Valley, so we will find it stimulating road building and road maintenance in Brazil. The fact that there are poor roads is the smallest difficulty to be overcome in the coffee field. The cheap cost of horse labor is a bigger handicap. In the summer time the weather in Sao Paulo is hot. It is within the tropics, meaning that for a time the sun is directly overhead. The heat would be much greater were it not for the fact that the state is on a plateau approximately 2700 feet high. This altitude has a very favorable influence on the climate.

The City of Sao Paulo is a good market for trucks. True, the city is not nearly as large as Buenos Aires or Rio de Janeiro, but it is growing very rapidly. To-day its population is approximately 500,000 and in 10 years it is expected it will have over 1,000,000 people. The buying capacity of Sao Paulo for passenger cars and motor trucks can scarcely be gauged by a population estimate. Its purchasing capacity is much greater than either Rio, Buenos Aires or Montevideo in ratio to population.

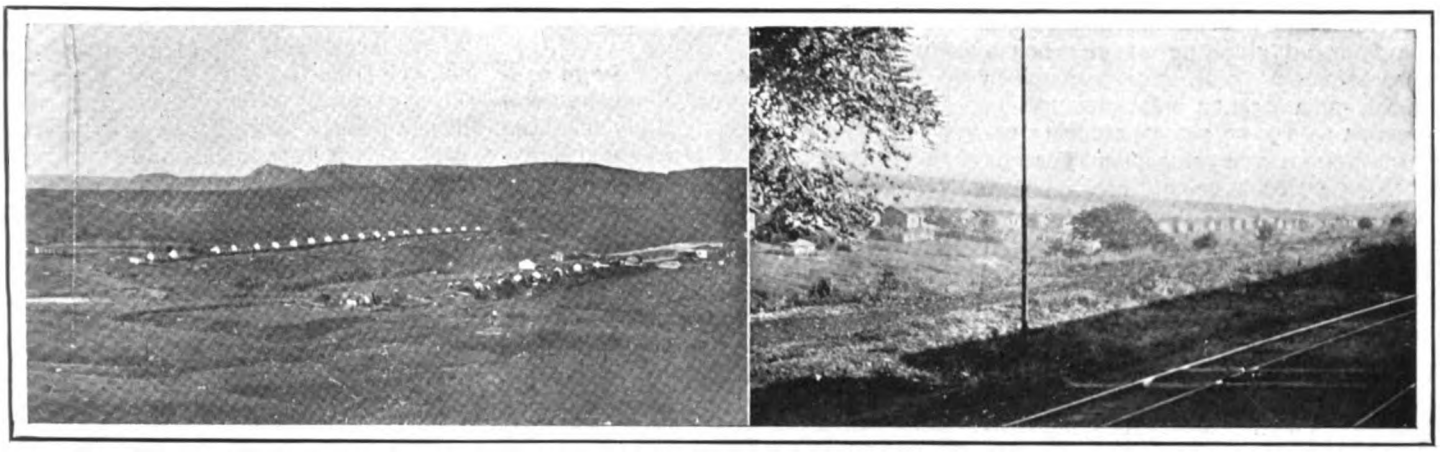
Sao Paulo Growing Fast

The city has increased nearly twenty fold in the last 30 years. The great



Often in parts of the State of Sao Paulo you will find the homes of several laborers on coffee plantations coupled together as shown here

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You see many rural scenes such as that shown at the left in the coffee land in Sao Paulo, Brazil. The row of white dots shows the ends of homes of workers on the coffee plantations. On many plantations you see several rows of such villages. The coffee grows on the tops of all the hills shown. Coffee is not grown in the valleys, the coffee bush thriving better on the high hilltops. In the foreground is the home of a coffee planter with all the necessary equipment for handling coffee. At the right is shown a part of a workers' village on a coffee plantation. The railroad generally runs close to the plantations, particularlythe large ones. Because of this, coffee hauls are often short from the plantation to the depot, but all of the plantations are not so favorably located

activity in the coffee area has been largely responsible for this growth, but to-day the city has within its boundaries so many activities and distributes to so large an area that its future as the second greatest, and perhaps the greatest distributing city in all South America, seems assured. Buenos Aires will unquestionably lead for many years, but Sao Paulo is sooner or later going to pass Rio as a great city. Perhaps this may not be in population, but in energy, influence and progressiveness.

Sao Paulo City Well Paved

The city is well paved and almost ideal for motor trucks. The newer streets are very wide. It is true that several of the older streets in the center of the city are narrow, but they are generally one-way thoroughfares which help traffic materially. As with all South American cities, the pavement is stone block with asphalt on the finer avenues. Sao Paulo reminds you much of Buenos Aires with its wide streets radiating into every part of the city. These streets have double trolley lines, fine wide sidewalks and the usual strip of green sward between the curb and the sidewalk.

The city is essentially a city of fine modern homes. It is filled with such. You travel over scores of streets lined with fine homes. All or nearly all have excellent gardens filled with a riot of tropical plants. Everything is clean. You have to stop and resurrect yourself out of a semi-day dream to make sure you are in the heart of Brazil and not in some part of Pennsylvania or other progressive U. S. A. section.

City Has Many Activities

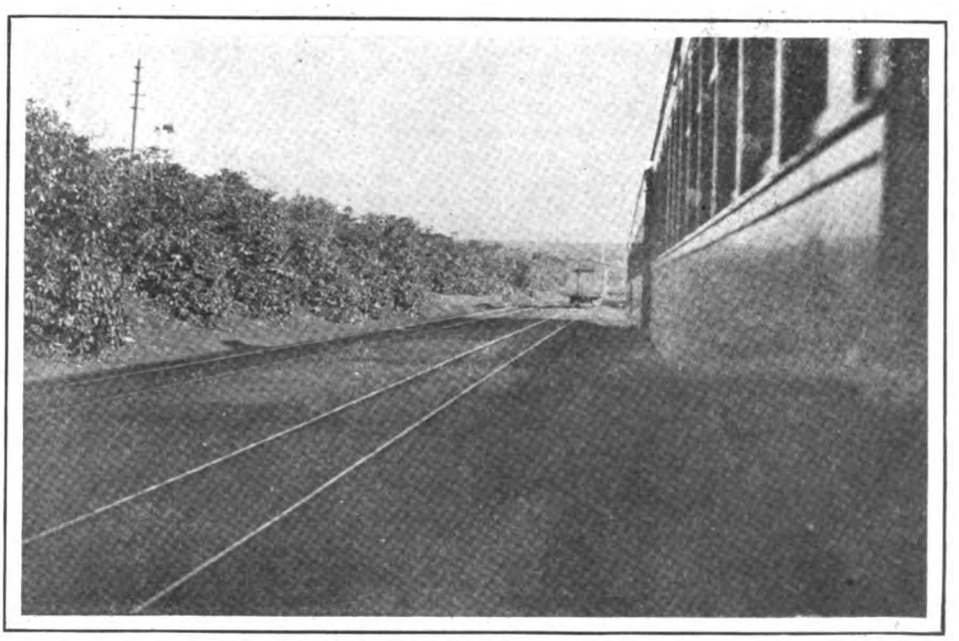
With relation to the truck buying capacity of Sao Paulo it is best to bear in mind that it has an unusual concentration of business activities.

An example: One hardware importer has large blocks of stock in six other diversified interests, such as a wire factory, a textile mill, a match factory, a hardware metal stamping plant and a wholesale provision store. Reaching this one man opens the possibility of selling trucks in six different industries. This is true with regard to hosts of the leading business men of the city.

A second example: One large industry owner has a controlling interest in ten different concerns, some merchandising and others manufacturing plants. In addition he has a large interest in twelve other organizations. Here is a man with great influence in twenty-two different organizations. This particular person has his own steamboats and does an enormous business. Selling trucks to such a person and through him making it possible to reach twenty-two concerns, gives a new phase to motor truck sales and should tend to make the introduction of trucks into the city relatively easier and simpler than if individuals were interested in only one organization.

New York Bank Gives Credit

In Sao Paulo the National City Bank of New York has had a branch for 2 or 3 years. This branch is already doing good work to make it easier for U. S. A. motor truck makers to do business in the City of Sao Paulo and also throughout the entire state. The bank maintains a large commercial department whose duties are entirely concerned with securing information of the different industries of the state as well as on the financial standing and the business honesty of the many firms in the state. This department has a corps of competent workmen, the same as in all of the other cities in South America where this bank has recently opened branches.



When traveling through the State of Sao Paulo you travel so close to the coffee fields that you can almost reach the coffee bushes from the train window. These coffee bushes are nearly of full-grown size. Everywhere you find coffee culture scientifically carried out. The plantations are clean, well kept and very orderly

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From this bank it is possible to get the financial standing of any house with which a U. S. A. truck maker might open agency relations. It is possible to-day to get as accurate information on such firms as on concerns in New Orleans or Buffalo. All of such arrangements should be taken up through the main office of the bank in New York City.

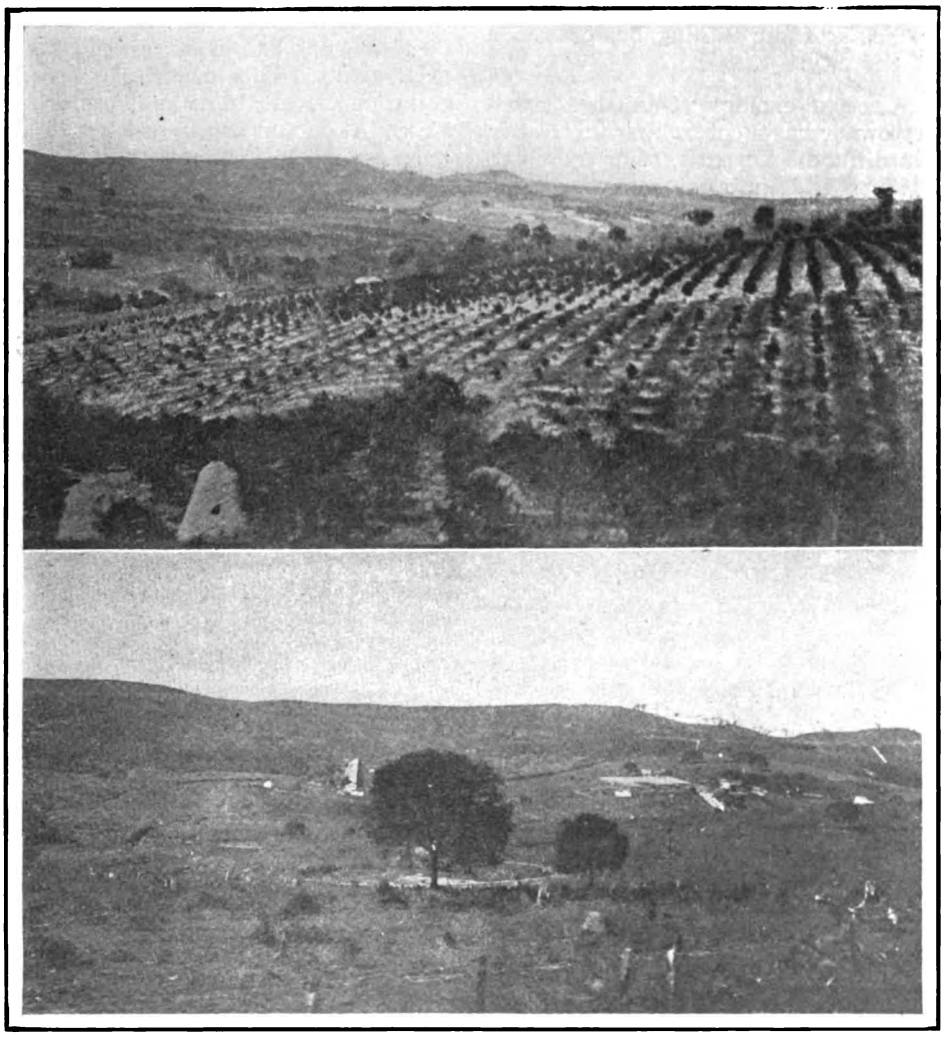
162 Concerns Should Use Trucks

We spent nearly half a day with the head of this department going over the various industries in the City of Sao Paulo with the hope of determining how many concerns are large enough and financially strong enough to be owners of motor trucks or motor delivery vehicles. The bank has a complete list of all business organizations in the city and has investigated them individually. Many of these concerns are manufacturers, others are large importers, others large wholesalers and others engaged in the various lines of business that are to be found in any city.

We found there are 162 large concerns in the city who should be owners of motor trucks. Many of these should own fleets of trucks and delivery vehicles. This estimate of 162 concerns is very conservative. No effort was made to make a big list, rather the idea was to be ultra conservative. It would be possible to double this number if you wanted to include those whose business is large enough to warrant the use of trucks. We differentiated between concerns having a business large enough to warrant their using motor trucks and those who are large enough and who are also financially strong enough to warrant their buying such at once.

Classes of Firms Needing Trucks

This list of 162 large and financially strong concerns included all lines of business and the following list gives a few of the more important ones:



At the top is shown a very poor coffee plantation. The bushes are not as large as they should be and some of them have perished. You rarely see a single acre of land in the country that is level. It is all rolling and when motoring along the roads you have many good hill-climbs to contend with. It is this rolling nature that makes the land more suitable for motor truck use. It will not be difficult to build good roads in such a country. There will always be good natural drainage. Directly above is a view of the rolling coffee country in the center of the State of Sao Paulo. It is through this country that many U. S. A. motor trucks will be sold in the next 5 or 10 years. The white buildings on the hillside mark the home of a coffee plantation owner. Around his home he has all the necessary tanks for soaking the coffee and terraces on which it is afterwards dried

Agricultural implements—There are twelve large firms importing such machinery from the U. S. A. and Europe. They generally carry varied lines and have to carry large supplies of spare parts. Not infrequently these firms sell motor cars, and carry lines of mill machinery and machinery that can be used in garages such as lathes, drills, presses, etc.

Biscuit factories—There are two large concerns and many smaller ones. The large ones should be using motor trucks. There are several of the smaller firms that would be warranted in using light delivery vehicles.

Breweries—There are two large breweries in the city and one in Ribeirao Preto, a city of 25,000 population, 241 miles north in the heart of the coffee country. The use of trucks in the brewery trade in Sao Paulo is identical with that in any U. S. A. city.

Wholesale clothing—Ten large concerns are engaged in this work. They have to transport the goods from the depot to their warehouses and then make city distribution to the different retailers. There is much teaming from the warehouse to the depots for shipment to interior cities and towns.

Dry goods importers—There are in addition to the above, nine dry goods importing houses. These firms have the usual need for trucks, transporting goods to and from the warehouses.

Hardware importers—Sao Paulo has nineteen hardware importers, all handling varied lines of hardware merchandise and machinery. They have a wide distribution to retailers and sell generally to other firms in the state and in adjoining states. Several of these importers are also large wholesalers.

Textile Mills—There are all told about twenty-nine textile mills in the city. These mills range in size, some small, some large. All have a legitimate use for trucks. They will require vehicles of different capacities. They may require trucks for general use around the factory as well as for handling raw and finished materials.

Saw Mills—Six saw mills are located within the city limits and there is much handling of logs and of the sawn lumber. There are deliveries to be made to the lumber yards and to the depots for shipment by railway.

Importers of provisions—There are seven of these, all large concerns. In addition there are many smaller ones.

Shoe factories—The city has five factories given over to the manufacture of shoes. The leather has to be brought to the factory and deliveries of shoes must be made to wholesale and retail local houses as well as to railway depots.

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General importers—Six of these concerns, the largest in the field, have general use for trucks.

Leather Goods—Four houses are devoted to handling this work.

In addition to these there are many other lines as follows:

Five wholesale drugs concerns.
Three electric goods concerns.
Three foundries.
One glass factory.
Two retail grocers.
Two contractors.
Three flour mills.
Two hat factories.
One hop dealer.
Two jute mills.
Three newspaper publishers.
Two meat packers.
One lime maker.
One lead pipe factory.
Three Campinas importers.
One screw factory.
Two soap factories.
Two sugar mills.
Two wholesale stationery companies.
One rope factory.
Two silk factories.
Three seed concerns.

Big Market for 1000-Pounders

To this list could be added scores of other concerns. No attention has been given to the hundreds of small shops which should be in the market for light delivery vehicles of 500 to 800 pounds capacity. There are scores of bakeries, small groceries, etc., etc. None of them is aware of the increased possibility of using light delivery vehicles. They are inclined to look upon the light motor vehicle as too much of an expense and an advertisement. They have not had it placed before them as an investment. They have not grasped the feature of extending business by the motor vehicle. They have not thought of improved service to customers because of faster and better delivery service.

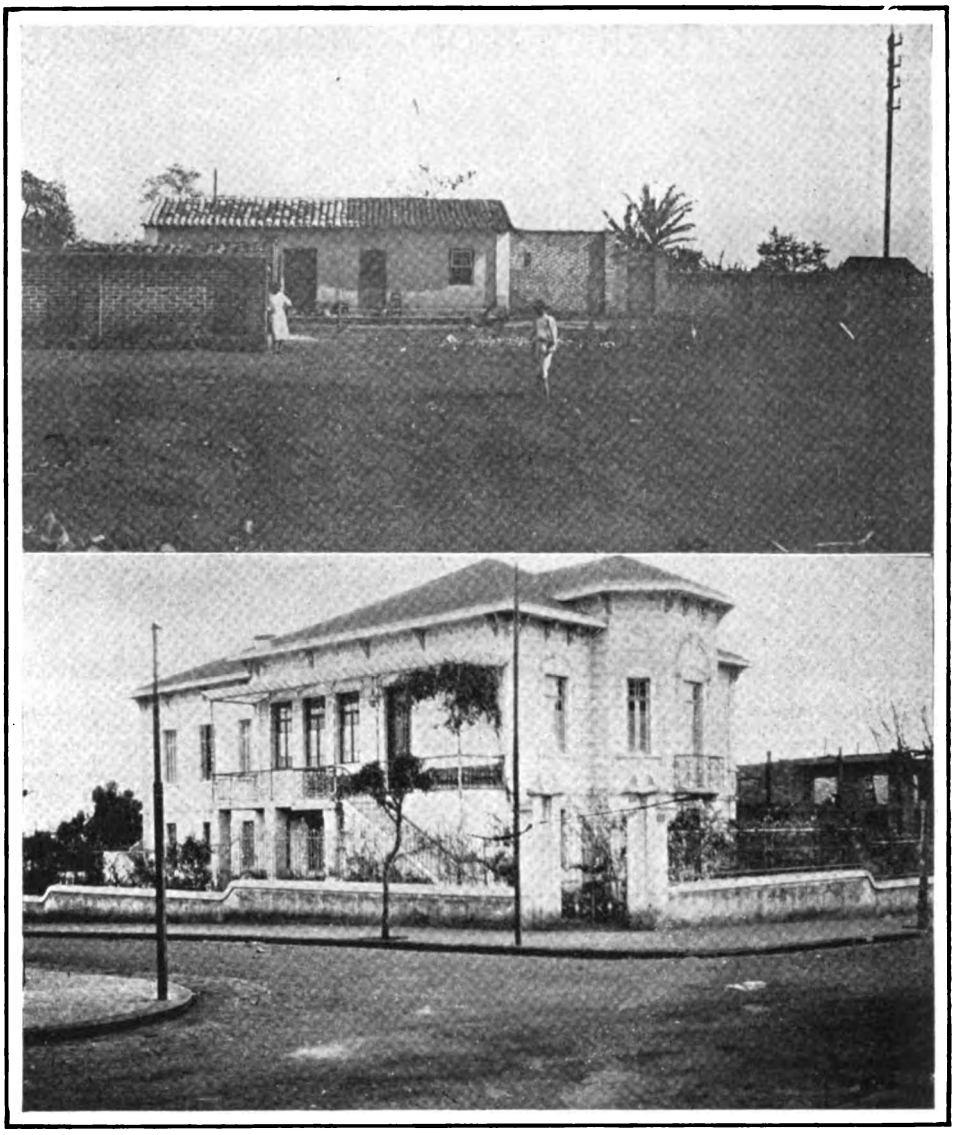
Horse Hire Cheap

Horse labor is naturally cheap in the city. The grade of horseflesh is poor. The city, being in the tropics, is hot. The altitude assists in keeping the temperature lower, but in summer the heat is considerable. Up to the present, horseflesh has been considered very cheap, and the business houses have not carefully kept tab on what their horses really cost them.

There is a truck market in Sao Paulo. It is the best in Brazil at present. Perhaps in other years Rio will be a greater field, but to-day it is not nearly as attractive as Sao Paulo. The city has plenty of good garages. There are plenty of places where you can get any kind of a good body built for a motor truck. The city has one of the largest garages in South America. It has a body-building department for passenger cars and trucks. Limousines and laudaulets are made. It has every facility for the work. The U. S. A. truck maker will find no difficulty in getting any kind of truck body.

There are plenty of progressive motor car dealers in Sao Paulo. A few of them handle trucks. There should be no difficulty in making good truck-selling connections.

With regard to introducing trucks in the city the only way is to send one or two trucks there and demonstrate them. That is imperative. In addition, there must be a big supply of spare parts carried in the city. You cannot sell vehicles without such a stock of parts. You must have catalogs in Portuguese as well as lists of spare parts and instruction books in the same language. These should be ready when the trucks are shipped. You need them then and not a year later. Good exporting policies are needed in connection with truck sales.



At the top is a typical home of a workman on the coffee plantations which you see through many parts of the State of Sao Paulo. These laborers do not own the land, but play the rôle of workmen only. It rather surprises you to find the modern home, shown directly above, 400 miles inland from the port of Santos in the State of Sao Paulo. This home is in the city of Ribairao Preto. It is not the only one of the kind in the city. The illustration is intended to show the progress that has been made far inland in the coffee country of Brazil. More U. S. A. cars are being sold in this part of Brazil than in sections around Rio de Janeiro

Trucks Salvation of Trolleyless Gothamites

(*Continued from page* 17)

Brooklyn boroughs have been better served. The residents of Yonkers who travel on the subway into lower New York have made use of the motor truck for more than 2 months. It must be remembered that the strike craze among the trolley men first started in Yonkers and got its first firm foothold there because of an ordinance which prohibits any motorman from running a trolley unless he has had 15 days' previous experience in the same work. The poor residents of Yonkers, Mount Vernon and nearby towns have been without street car service of any regularity since early August.

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Army Truck Train Makes Record 858-mile Haul



The United States Army Truck Train No. 13, composed of thirty-one 3-ton Riker trucks, passing through desert land on its record-breaking 858-mile run between Columbus, N. M., and San Antonio, Tex. The trip was made in 17 days, of which 2 were spent in El Paso and 2 more in building roads *en route*. The train averaged 66 miles per day of actual running time. The greatest mileage covered in 1 day was 126 and the least 3, this low run being on one of the days spent in road building. The convoy was self-sustaining in every respect, carrying in addition to its load of supplies, its gasoline, oil and water and subsistence for the crew

OVERLAND from Columbus, New Mexico, to San Antonio, Texas, a distance of 858 miles, the United States Army Truck Train No. 13, composed of thirty-one 3-ton Riker trucks, has just created a new record in the annals of our army transportation by covering the distance in 13 days of actual running time. This is an average of 66 miles per day of actual running time. While many motor trucks in the more peaceful pursuits of commerce cover more miles per day, week in and week out, their performance is accomplished for the most part over fair to good roads. But this was not the case with Truck Train No. 13.

With the exception of a stretch of road of about 30 miles leading into San Antonio at the end of the trip, the run was made over a roadless country in which the alkali dust did its best to injure the truck mechanism and make it disagreeable for the drivers. The greater part of the route was across untrailed desert whose only tractive surface was a thin sunbaked layer over the bottomless sand.

At many points it was necessary for the drivers to build roads for the trucks from fire wood carried on the chuck trucks—that is, those which carried the subsistence for the train, for it was self-supporting in every way. In all about 58 miles of roadway were built during the run. This work took about 2 days. In addition, two other days were spent in El Paso, making the total elapsed time of the run 17 days.

Nor was road making the only difficulty encountered, for many times it was necessary for the entire train to ford streams flooded by the torrential rains of the border district or to pull through long stretches of gumbo mud, which one of the drivers described as being several hundred times as bad as the worst mud ever made from Wisconsin red clay.

A Significant Comparison With Mules

Under such conditions the record of the train is most commendable. When it is considered in comparison with the work which could have been accomplished by mules, its significance is at once apparent.

The average day's travel which the United States Army expects to get from its four-mule wagons is 17 miles. What distance mules could have covered in 17 consecutive days under the conditions under which the truck train operated, is only problematical. If the maximum average distance which previous experience has taught they could cover was maintained, it would have taken 47 days—a comparison which shows clearly the relative merits of the old and new methods.

In spite of the many difficulties which had to be overcome, the average of 66 miles a day running time is highly gratifying. On the day during which the lowest mileage was made, that spent in road building, 3 miles were covered. The best day's run was 126 miles.

The train ran into San Antonio under command of Capt. John A. Pearson, on September 2. Every truck was in good condition and the entire fleet was at once put into service of the Quartermaster's Department.



The train as it appeared after reaching San Antonio on September 2. It was in command of Capt. John A. Pearson and every truck was in such good condition at the end of the run that the entire fleet was at once put into regular service with the Quartermaster's Department at San Antonio

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Three White 5-tonners shipped by boat from Cleveland, Ohio, to Buffalo, N. Y., from whence they were driven overland to Worcester, Mass., by 48 hours of continuous driving. They were purchased by the Norcross Grinding Co., of Worcester. That concern had many contracts to fulfill and it was necessary to continue its deliveries. These would have been stopped if the strike had gone into effect as planned. In buying the trucks, the Norcross company specified that the vehicles must be delivered on the Tuesday following Labor day. They arrived at the Norcross plant on time and were immediately put into service. Bodies had been fitted at the factory in Cleveland and filled with straw in which the extra crew of drivers slept during the overland run

Trucks Delivered Overland to Beat R. R. Strike

Strike Threat Causes Frantic Efforts to Get Vehicles Quickly

THE threatened railroad strike which fortunately did not occur as planned on Labor day, caused many manufacturers to make frantic efforts to obtain motor trucks so that their businesses would not be entirely crippled. In many cases these firms could not buy any trucks in the city in which they were located because options had been taken on all of the available commercial vehicles. In Boston it was said that not one truck could have been purchased there 48 hours after the strike had gone into effect.

These conditions caused many hurry calls to be sent to the truck factories for new vehicles, two of such cases being described and illustrated on this page.

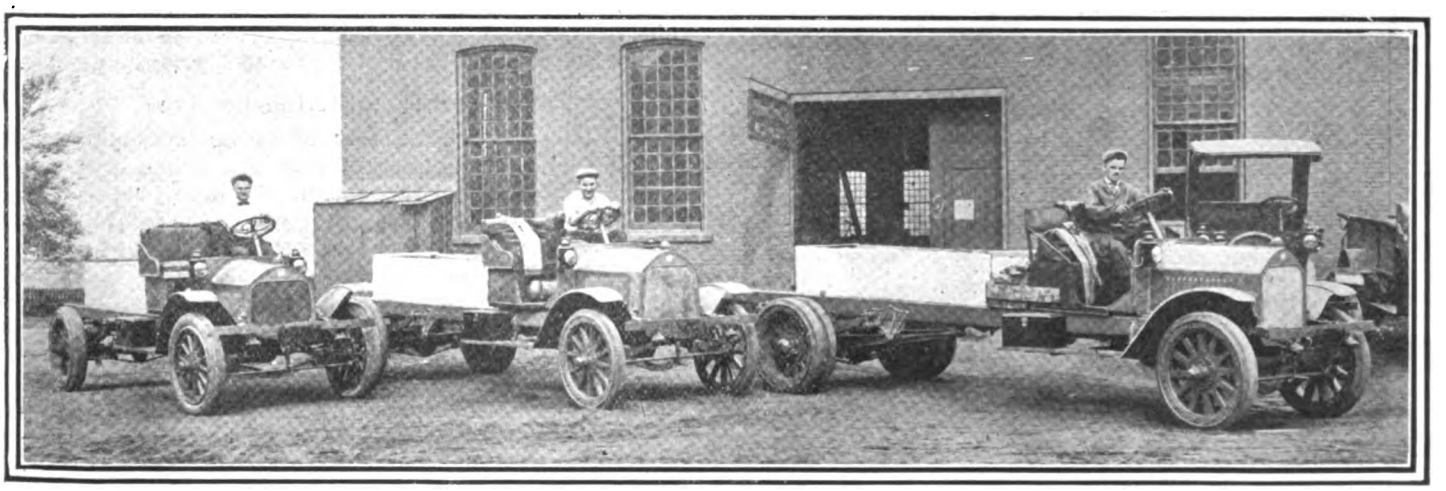
The Britton-Stevens Motor Corp., Boston, Mass., agent for the Maccar truck made by the Maccar Truck Co., Scranton, Pa., had an order for three trucks which had to be delivered by 9 a. m. Labor day. Accordingly three trucks, a 1½-tonner, a 2½-ton unit and a 3½-ton vehicle left the Maccar plant at noon on Friday, September 1, on an overland trip to Boston. They arrived there on schedule at 9 a. m. Labor day. No night driving was done. The route ran through Delaware Water Gap, Port Jervis and Middletown to New York City and thence along the shore road to New Haven and from there by way of Springfield and Worcester to Boston.

Whites Make 48-Hour Run

Another example of rapid delivery was furnished by the White Co. of Cleveland, Ohio. The Norcross Grinding Co. of Worcester, Mass., had a lot of contracts to fulfill and it was necessary to continue its work of delivery. So the officials scouted around for motor trucks.

The Seymour Automobile Co. of Worcester, agent for the White, was asked what it could do in sending three 5-ton trucks to the plant. Conferring with the Boston office and with Cleveland, it was promised that three trucks would be delivered in a few days. The Norcross Grinding Co. specified on Saturday that the trucks must be at its plant on noon of Tuesday, the day after Labor day. The order was accepted.

A crew of men under Foreman Day of the New England White branch left on the Saturday afternoon train for Buffalo. The three trucks had been loaded on a steamer Saturday night at Cleveland. The drivers met them Sunday and a schedule was mapped out to reach Worcester by 48 hours' continuous driving. The start of the trip across New York State and through Massachusetts was made Sunday noon. The bodies had been loaded with hay and the spare drivers took turns sleeping with the regular men on the way. Promptly on time the trucks drove into Worcester and were at the doors of the Norcross Grinding Co. Tuesday noon. The net speed averaged was 10 miles an hour and the trucks made better than 11 miles per gallon of gasoline.



Three Maccar trucks which made a quick overland run between Scranton, Pa., and Boston, Mass. Like the Whites shown above, they too were needed for immediate service caused by the strike threat

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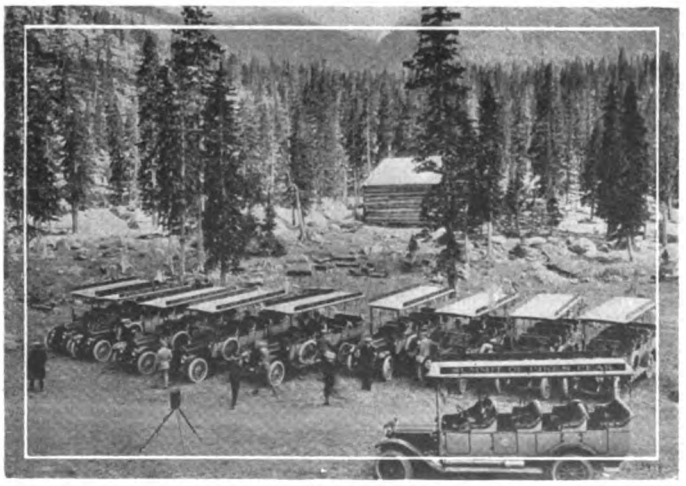


*During the run from Colorado Springs to the summit there is a rise in elevation of 8109 feet. * * * * From that point it is said that more miles of mountain and plain are visible than from any other point on the globe reached by motor vehicle*

Motor Trucks at the Roof of the World

ASCENDING almost 3 miles in the air, a fleet of White motor buses have carried more than 10,000 passengers up the new Pike's Peak boulevard since that highway was opened to the public on July 23 last. These buses were the backbone of the transportation facilities during the recent mountain-climbing motor vehicle races. Running in fleet formation most of the time, they made trip after trip from the beginning of the boulevard at Cascade, Col., to the summit of the mountain and to the intermediate observation points.

While the highway is a marvelous road-building achievement, the 26-mile run to the top is a gruelling test on a motor truck due to the long uphill climb and the many sharp hairpin turns. While the run is hard on the vehicles it is delightful for the passengers, every mile of the trip being crowded with scenic interest that possesses all the grandeur of the Alps.



Running in fleet formation most of the time, they made trip after trip from the beginning of the boulevard at Cascade, Col., to the summit of the mountain and to the intermediate observation points

During the run from Colorado Springs to the summit there is a rise in elevation of 8109 ft. The White fleet, which consists of twelve trucks and three passenger cars with bus bodies, makes two round trips every day, climbing the rock-walled sides and continuing to the snow-clad summit above the clouds. There, a 40-min. rest is allowed the passengers to inspect the Summit house, secure refreshments and view the wonderful panorama of more than 60,000 sq. miles of scenic landscape of unequaled beauty.

The sunrise trip of the buses is the most popular trip with the tourists, the buses leaving Colorado Springs at midnight and arriving at the summit in time to see the sun rise and the shadows lift from the valleys and woodland below. The buses make the descent shortly afterward and arrive back at the hotels at the springs in time for breakfast.

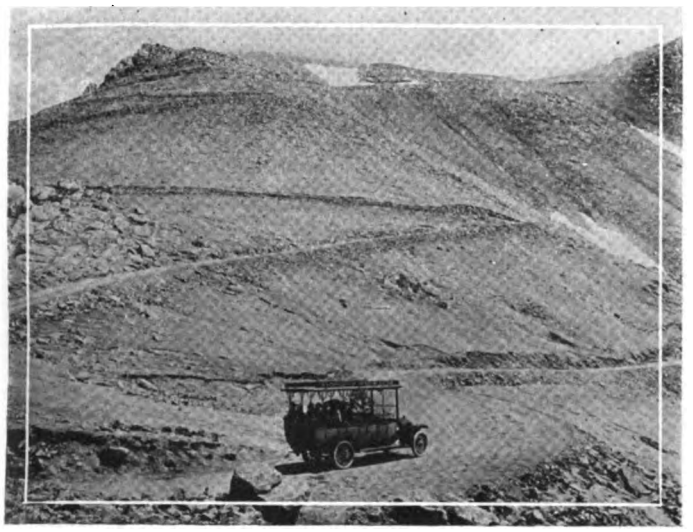
From the summit it is said that more miles of mountain and plain are visible than from any other point on the globe reached by motor vehicle. The marvelous mountain boulevard with its motor carriers, which make the ascent in 2½ hr., mark the passing of the long, weary rides in lumbering stage coaches that could make but 2 or 3 miles per hour at the best over rough mountain roads.

Truck Transplants Monster Tree

PROVING the practicability of motor trucks in solving difficult hauling problems, a 5-tonner owned by a Philadelphia, Pa., contractor recently carried a monster live oak tree from a nursery to the estate of its purchaser, 49 miles away. Large estate owners who have big trees they wish removed or those who have fine specimens they would like to have transplanted in more suitable locations on their grounds may take their cue from the success of Stedman Bent, the Philadelphia contractor.

One of the latter's 5-ton White trucks was employed to carry the excellent specimen of oak shown in the accompanying illustration from a nursery near Chestnut Hills, Pa., to the estate of Eugene Du Pont at Greenville, Del., a distance of 49 miles. The roads over which the truck had to travel with its unwieldy burden were of the worst

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While the highway is a marvelous road-building achievement, the 26-mile run to the top is a gruelling test on a motor truck due to the long uphill climb and the many sharp hairpin turns

possible kind, yet the vehicle and its load arrived at its destination without injury of any kind.

The tree was 40 ft. high and 13 in. in diameter at the bottom. The tree without the roots was of no value for transplanting, so the roots had to be taken along too. These, with the ball of earth which encased them weighed approximately 8470 pounds or about 4¼ tons. The tree itself and the rigging by which it was lifted in place on the truck body weighed an additional ton, making the total load 5¼ tons.

After the earth had been removed from around the roots as the tree stood in the ground, it was jacked up to the surface by means of cross timbers. Then the roots were wrapped in canvas to prevent damage and the tree slid on skids leading to the truck body. It was then pulled onto the truck in its upright position by means of a block and tackle attached to a convenient stake, it being steadied during the process by means of several guy ropes as shown.

Michigan Fruit Farmer Sells Best by Truck

FRUIT farming now offers greater opportunities than ever before. This is partly so because it is no longer a neglected side-line but a full-fledged business of its own. But the farmer who raises the biggest, sweetest or most delicious apples, pears, peaches or what not, stands to lose his profit on his work and some to boot, for that matter, if he cannot get his goods to market at the proper time and in the proper condition.

The matter of getting his goods to market has always been one of the farmer's bugbears. It used to be entirely beyond his control. He used to ship his carload of apples or other fruit to a commission merchant in the nearest city. Sometimes he would receive an answer in a few days, informing him that the market in apples, for instance, was not good at the time the goods arrived. Besides, some of the apples were undersized, so the letter would read, adding that part of the shipment was rotting perceptibly and requesting a cash remittance of several dollars to enable the freight charges to be paid, as the sale of the goods in a poor market had left a deficit.

Conditions such as these naturally were not conducive to a wild scramble among the farmers to raise fruit for profit. These conditions still hold good in many parts of the country. The progressive farmer, however, is now using motor trucks to haul his goods to market. His trucks are not dependent either upon rails or time tables. He can send them to any one of several markets, if he so desires, and at a time when his goods will bring the best prices.

He keeps in close touch with the markets by his daily newspaper and his telephone. When fruits are bringing good prices, he loads his shipment into his truck and away it goes, timed to arrive at the market at the proper hour. The goods have not had to undergo a slow journey in a railroad car.

One such farmer who makes use of his trucks in the above manner is the head of the firm of D. Oliver & Sons, Orchard Lake, Mich. He uses a 1½-ton G. M. C. truck to haul his fruit to the Detroit markets, where it arrives in the best possible condition and at the best possible time. This means high prices and a reasonable profit on his work.

Truck Gives Insane Patients Daily Joy Rides

CARRYING insane patients on daily trips thrcughout the surrounding country is the novel purpose for which a White 1½-ton truck was purchased by the South Dakota State Hospital at Yankton. On every fair day of the year eighty of the patients are taken for a ride over the beautiful country roads around Yankton.

The service was instituted 4 years ago, when the hospital purchased a 1½-ton White chassis and equipped it with a twenty-two-passenger bus body. In good weather the bus is sent out four times a day, twice in the morning and twice in the afternoon. It makes from 15 to 20 miles each trip.

The use of the bus for this purpose has proved very advantageous in carrying on the welfare work of the institution. According to Dr. L. C. Mead, superintendent of the hospital, the purchase of the truck is conceded to have been one of the wisest expenditures of money ever made for the pleasure and entertainment of the inmates.

*Proving the practicability of motor trucks in solving difficult hauling problems, a 5-tonner * * * recently carried a monster live oak tree from a nursery to the estate of its purchaser, 49 miles away. The tree was 40 feet high and 13 inches in diameter at the bottom * * * and with the roots and rigging weighed 5¼ tons.*



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TRUCK BATTERY SERVICE SYSTEM

Geveco System Is Now Employed in Ten Cities from Coast to Coast

To the Editor, COMMERCIAL VEHICLE:

Will you please outline the system, which I understand is employed by several electric truck makers in conjunction with central stations, in which it is possible to buy electric trucks with duplicate batteries? I understand that these batteries are kept at the central station when not in use or while being charged, and that an owner of electric trucks under the system simply has to drive his vehicles to the station to get a fully-charged battery when the possible mileage of the ones in the vehicles has been exhausted. Will you also please state in what cities such a system as described is in use?—J. H., New York City.

The battery system to which you refer was fully explained in a paper by P. D. Wagoner which appeared in the June 15, 1916, issue of THE COMMERCIAL VEHICLE. In short, the system, as now practised on the Geveco trucking system, consists of the sale of an electric truck less battery, the vehicle being supplied with a specially-designed, detachable battery cradle. By the use of this interchangeable cradle the company furnishing power is enabled to exchange a discharged or partly-discharged battery for a fully-discharged one in from 2 to 5 min. The current used is sold by the mile, according to the size of the vehicle and the amount of mileage used as recorded by the odometer.

At the present time this battery service system is conducted by the General Vehicle Co., Long Island City, N. Y., in connection with central stations and battery companies in the following cities: Hartford, Conn.; Spokane, Wash.; Boston, Mass.; Baltimore, Md.; Harrisburg, Pa.; San Francisco and Los Angeles, Cal.; Worcester and Fall River, Mass., and Wichita. The Commercial Truck Co. of America also has somewhat of a similar system in use in Philadelphia, Pa.

IGNITION USED ON 1916 TRUCKS

Reader Wants Comparative Percentages of Single and Dual Types

To the Editor, COMMERCIAL VEHICLE:

Will you kindly state what percentage of the 1916 motor trucks employed single ignition with a high-tension magneto, and what percentages employed dual and double and dual-double ignition?—A. B. C., New York City.

Devoted to topics pertinent to commercial vehicle operation design and maintenance. Open to the use of all readers. Communications must be accompanied by the sender's name and address, confidential if preferred. No charge is ever made for this service.

It is not possible to state what percentage of the trucks sold in 1916 were equipped with any particular kind of ignition apparatus, due to the inability to more than approximate the various sizes of the different makes of trucks sold. THE COMMERCIAL VEHICLE can, however, state what percentages of the various forms of ignition were employed on the number of models offered on the 1916 market, as follows:

Single ignition .....73 per cent
Dual ignition .....27 per cent
Dual-double and double..00 per cent

Of the 73 per cent of the models offered which employed single ignition, a great majority made use of the high-tension magneto.

In this connection it must be remembered that the above percentages apply only to the number of models offered, and not to the number of trucks actually sold.

FORMULA FOR DRAWBAR PULL

A Simple Formula of Five Variables and One Constant Is Convenient

To the Editor, COMMERCIAL VEHICLE:

Will you please give me a formula by means of which I may determine the drawbar pull of a motor truck?—H. JUDSON, New York City.

A convenient formula for the calculation of the drawbar pull of the average motor truck on level ground is as follows:

$$P = \frac{5.18364 \times B^2 \times S \times N \times R}{D}$$

Where P is the tractive power in pounds
B is the engine bore in inches
S is the engine stroke in inches
N is the number of cylinders
R is the gear reduction
and D is the diameter of the driving wheels in inches.

The gear reduction mentioned is the total gear ratio between the motor and the road wheels. It may be taken at any speed, depending upon at which speed the drawbar pull is desired. It is customary, however, to take it in high gear for ordinary work.

U. S. TRACTOR MANUFACTURERS

Britons Ask for List of Builders of Farm Motors

To the Editor, COMMERCIAL VEHICLE:

Could you put us in touch with American firms manufacturing agricultural machines of every description?—P. P. GODINS, Holborn, London, W. C.

Following is a list of agricultural tractor manufacturers known to THE COMMERCIAL VEHICLE:

Advance-Ramley Thresher Co., LaPorte, Ind.—Oil-Pull.
Aultman & Taylor Mch. Co., Mansfield, Ohio—Auto-Taylor.
Avery Co., Peoria, Ill.—Avery.
Avery & Sons, D. F., Louisville, Ky.—Louisville-Avery.
Allis-Chalmers Mfg. Co., Milwaukee—Allis-Chalmers.
American Tractor Co., Des Moines, Ia.—American Oil.
Andrews Tractor Co., Minneapolis, Minn.—Andrews.
Abenaque Machine Wks., Westminster Station, Vt.
American Gas Engine Co., Kansas City, Mo.
Auto Tractor Co., Niles, Mich.
American Tractor Co., Minneapolis, Minn.
Bates Tractor Co., Lansing, Mich.—Bates.
Ball Tractor Co., Minneapolis, Minn.—Ball.
Best (C. L.) Gas Traction Co., Oakland, Cal.—Tracklayer.
Buckeye Mfg. Co., Anderson, Ind.—Buckeye, Jr. & CT4.
Bullock Tractor Co., Chicago—Creeping Grip.
Buffalo-Pitts Co., Buffalo, N. Y.
Buck Auto Plow Co., Fremont, Neb.
Barry Tractor Co., Muscatine, Iowa.
Bacon, E. R., San Francisco, Cal. (not manufacturing now).
Bacon, E. R., Los Angeles, Cal. (not manufacturing now).
J. I. Case, T. M. Co., Racine, Wis.—Case.
Corn Belt Tractor Co., Minneapolis, Minn.—Corn Belt Tractor.
C. O. D. Gas Tractor Co., Crookston, Minn.—C. O. D.
Chase Motor Truck Co., Syracuse, N. Y.—Chase.
Common Sense Gas Tractor Co., Minneapolis—Common Sense.
Chief Tractor Co., Detroit, Mich.
Dauch Mfg. Co., Sandusky, Ohio.
Dayton-Dick Co., Quincy, Ill.—Leader.
Denning Motor Implement Co., Cedar Rapids, Iowa—Steel Clad.
Diamond Iron Works, Minneapolis—Diamond.
Dosinger & Bros., Inc., Lancaster, Pa.—C. H. A.
Electric Wheel Co., Quincy, Ill.—Light all work.
Emerson-Brantingham Implement Co., Rockford, Ill.
Eagle Mfg. Co., Appleton, Wis., Eagle.
Fairmont Gas En. & R. R. Motor Car Co., Fairmont, Minn.
Fairbanks, Morse & Co., Chicago.
Ford Tractor Co., Minneapolis, Minn.
Four Wheel Drive Tractor Co., Clintonville, Wis.—Stewart.
Farm Horse Traction Works, Hartford, S. D.
Ford, Henry & Son, Birmingham, Mich.
Farm Engineering Co., Sand Springs, Okla.
Good Roads Mch. Co., 50 Church Street, N. Y. C.—Yuba Champion.
Gray Tractor Co., Minneapolis, Minn.—Gray.
Gear Scott & Co., Richmond, Ind.
Gasport Motor Co., Gasport, N. Y.
Geiser Mfg. Co., Waynesboro, Va.
Gile Boat & Engine Co., Ludington, Mich.
Golden Gate Gas Traction Co., West Berkeley, Cal.
Hackney Mfg. Co., St. Paul, Minn.—Hackney.
Hart-Parr Co., Charles City, Iowa.—Little Devel—Old Reliable Oil King.
Hoke Tractor Co., South Bend, Ind., Hoke.
Holt Mfg. Co., Peoria, Ill.—Caterpillar.

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Huber Mfg. Co., Marion, Ohio—Huber.
Hume Mfg. Co., Hume, Ill.—Hume.
Happy Farmer Tractor Co., Minneapolis—Happy Farmer.
Harrow (A. T.) Tractor Co., Detroit, Mich.—Michigan.
Heer Engine Co., Portsmouth, Ohio.
Henry, Willard & Henry Co., York, Pa.
Hercules Gas Engine Co., Evansville, Ind.
Humber-Anderson Mfg. Co., Gladstone, Minn.
International Harvester Co., Chicago—Mogul Titan.
Joliet Oil Tractor Co., Joliet, Ill.—Gates.
Killen Strait Mfg. Co., Appleton, Wis.
Kinkead Tractor Co., Minneapolis, Minn.
Lawter Tractor Co., St. Marys, Ohio—Lawter.
Lion Tractor Co., Minneapolis, Minn.—Lion.
Lawson Mfg. Co., New Folstein, Wis.—Lawson.
Lombard Tractor Co., Waterville, Me.
McIntyre Mfg. Co., Columbus, Ohio—Farmer Boy.
McKinley Traction Cultivator Co., St. Louis, Mo.
Mayer Bros. Co., Mankato, Minn.—Little Giant.
Maytag Co., Newton, Iowa—Maytag.
Minneapolis Steel & Mch. Co., Minneapolis—Twin City.
Minneapolis Threshing Mch. Co., Hopkins, Minn.—Minn.
Moline Plow Co., Moline, Ill.—Moline Universal.
Moreton Truck & Tractor Co., Harrisburg, Pa.—Morton.
M & M Tractor Co., Minneapolis, Minn.
Mercury Mfg. Co., Chicago, Ill.
Nilson Farm Mch. Co., Minneapolis, Minn.—Nilson.
National Pulley & Mfg. Co., Chicago—Paramount.
Nichols & Shephard Co., Battle Creek, Mich.—Oil-Gas.
Nevada Truck & Tractor Co., Nevada, Iowa.
New Age Tractor Co., Minneapolis, Minn.
Orchard Machinery Co., Gasport, N. Y.
Ohio Mfg. Co., Upper Sandusky, Ohio.
Ohio Tractor Mfg. Co., Marion, Ohio.
Parrett Tractor Co., Chicago, Ill.—Parrott.
Peoria Tractor Co., Peoria, Ill.
Parker Motor Plow Co., Richmond, Va.—Parker Motor Plow.
Pioneer Tractor Mfg. Co., Winona, Minn.
Patch Bros., Oshkosh, Wis.
Phoenix Mfg. Co., Eau Claire, Wis.
Quincy Engine Co., Quincy, Ill.
Rock Island Plow Co., Rock Island, Ill.
Rumely (Leo) Tractor Co., La Porte, Ind.—Hoosier.
Simplex Tractor Co., Minneapolis, Minn.—Simplex.
Sweeney Tractor Co., Kansas City, Mo.—Iron Horse.
St. Paul Machine Co., St. Paul, Minn.—St. Paul.
Samson Iron Works, Stockton, Cal.
Steel King Motor Plow Co., Detroit, Mich.
Swaney Tractor Co., Carroll, Iowa.
Smith & Sons Mfg. Co., Kansas City, Mo.
Stickney, Chas. A. & Co., St. Paul, Minn.
Strite Tractor Co., Minneapolis, Minn.
Utility Steel Tractor Co., Antigo, Wis.
Waite Tractor Sales Co., Chicago, Ill.—Waite.
Wallis Tractor Co., Racine, Wis.—Wallis.
Waterloo Gasoline Engine Co.—Waterloo, Iowa—Waterloo Boy.
Ward Tractor Co., Lincoln, Neb.—Ward.
Weber Engine Co., Kansas City, Mo.—Weber.
Willmar Tractor Mfg. Co., Watertown, S. D.
Wolf Tractor Co., LaPorte, Ind.
Yuba Construction Co., Marysville, Cal.—Yuba Ball Tread.

NEEDS MONITOR SPARE PARTS

Iowa User Wants Name and Address of One of the Older Truck Concerns

To the Editor, COMMERCIAL VEHICLE:

We would like to know by whom and where the Monitor motor truck was built and where we could obtain spare parts for such a vehicle—NORTH IOWA MOTOR CO., Mason City, Iowa.

The Monitor motor truck was built by the Monitor Automobile Works, Janesville, Wis. According to information which THE COMMERCIAL VEHICLE has at hand, the Monitor company is still in business, although not manufacturing trucks except on a very small scale. You may obtain spare parts for the Monitor truck by writing to the company at the address given above.

WANTS DATA ON FORD ADAPTERS

New York Reader Desires Classes of Devices and Names of Makers

To the Editor, COMMERCIAL VEHICLE:

Will you please advise me how many makes of Ford attachments for converting vehicles of that make into 1-ton trucks are on the market at the present time? Will you please state if there are any general classifications into which these various types may be divided? I would also like to know the names of the makers of such devices and their addresses.—INTERESTED, New York City.

To answer the queries in the order given:

1—There are twenty-eight makers of Ford adapters in the field at the present time according to information which THE COMMERCIAL VEHICLE has at hand.

2—Ford adapters may be divided into five general classes according to what portions of the Ford frame and rear-end assembly are retained in the converted vehicle, as follows:

1—Those in which the frame is cut at the center and an additional section fitted, the Ford rear axle being retained intact. An alternate method in the same class is the employment of an additional frame section at the rear of the Ford frame. The Ford rear axle is also retained in the latter method. The Ford wheelbase is increased in both of these methods.

2—Those in which the Ford axle is used in connection with steel wheels with housings carried in roller bearings independent of the axle. The Ford wheelbase is not increased in this class.

3—Those in which a telescoping frame is employed carrying at its rear end a conventional chain-driven truck axle assembly.

4—Those in which the Ford axle is used as a jackshaft of an internal-gear-driven rear axle in which all the remaining parts are furnished in a unit with a telescoping rear end frame.

5—Those in which the entire Ford rear axle assembly is replaced by a complete rear truck axle either of the worm- or internal-gear-driven type in conjunction with a telescoping or overlapping frame.

A more detailed description of the five types outlined above may be obtained from the August 15 and September 1, 1916, issues of THE COMMERCIAL VEHICLE.

3—The names and addresses of Ford adapter makers are as follows:

Ames Motor Car Co., Owensboro, Ky.
Automobile Mfg. & Engineering Co., Detroit.
Chain-Ton-Ford Co., Philadelphia, Pa.
Davis Mfg. Co., Los Angeles, Cal.
Dearborn Motor Truck Co., Chicago.
Detroit Truck Co., Detroit.
Wm. J. Forbes, Boston, Mass.
Franklin Two-Way Converter Co., Chicago.
Hayes-Diefenderfer Co., New York City.
Hudford Co., Philadelphia, Pa.
Iowa Motor Truck Co., Ottumwa, Iowa.
Jewett Car Co., Newark, Ohio.
Maxfer Truck Co., Chicago.
Motor Accessory Distributing Co., Boston, Mass.
Rayford Co., Philadelphia, Pa.
Redden Motor Truck Co., New York City.
Rothweiler & Co., Seattle, Wash.
Scott Machine Wks., Seattle, Wash.
Simplex Truckform Co., Chicago.
Smith Form-A-Truck Co., Chicago.
Swedish Crucible Steel Co., Detroit.
Truck Attachment Co., Seattle, Wash.
Trucktor Mfg. Co., Chicago.
Union Truck Mfg. Co., New York City.
Utility Motor Truck Co., Chicago.
Woodward Truck Attachment Co., Seattle, Wash.
Wright Truck Attachment Co., Seattle, Wash.
Xtend-A-Ford Co., Philadelphia, Pa.

BUILDERS OF DUMPING BODIES

Reader Desires to Purchase Dump-Type Body for a 1-Tonner

To the Editor, COMMERCIAL VEHICLE:

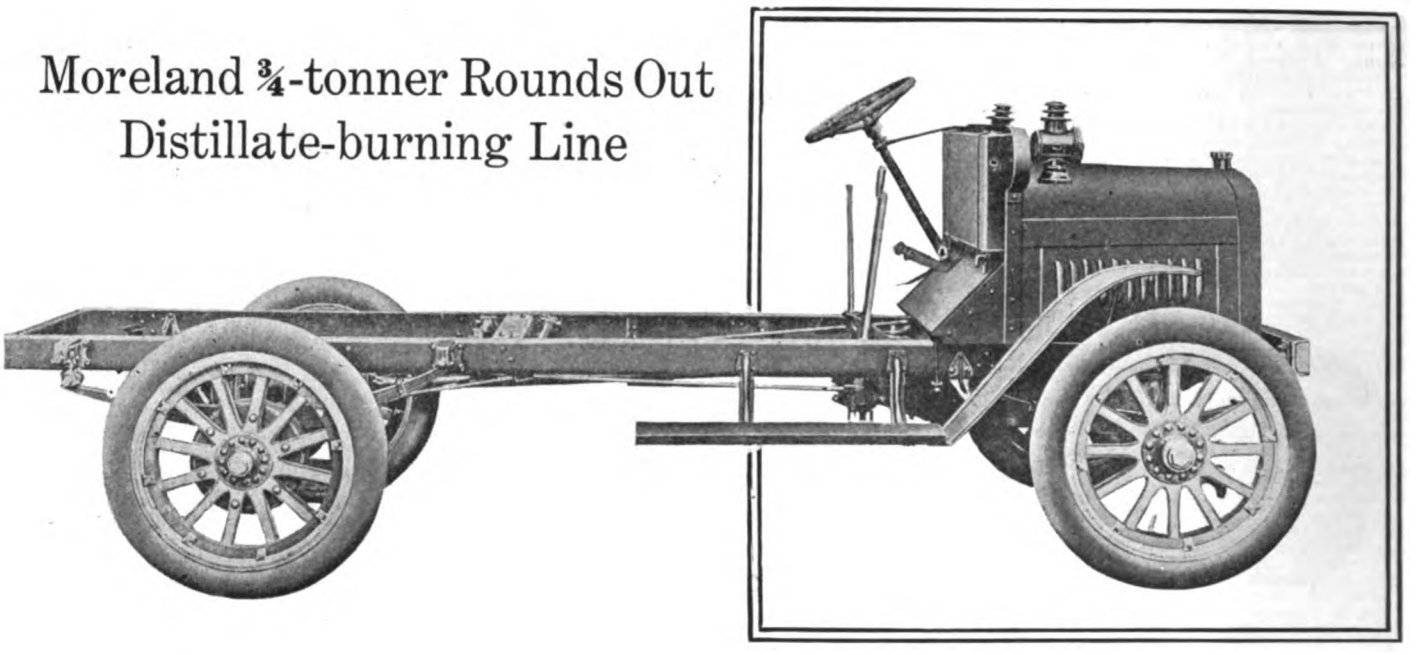
Will you please supply me with a list of body makers who could furnish me with a dumping body for a 1-ton truck?—LA FRANCE GARAGE CO., Williamsport, Pa.

The following list of body builders make a specialty of dumping bodies of various types:

Bruder, Lawrence, 211-13 W. Second St., Cincinnati, O.
Duffey Bros. Motor Truck Co., San Francisco, Cal.
Fitz Gibbon & Crisp, Calhoun St. and P. & R. R. R., Trenton, N. J. "Lion."
Heil Co., 26th and Montana Aves., Milwaukee, Wis.
Lally Commercial Body Co., Paris St., Everett, Mass.
Lee Loader Co., Chicago, Ill.
Lion—See Fitz Gibbon & Crisp.
Littleford Bros., 453-57 E. Pearl St., Cincinnati, O.
Lynch Mfg. Co., Hammond, Ind.
Monahan Vehicle Co., Kinsely Ave. and Eagle St., Providence, R. I.
Motor Truck Body Co., 611 Central Ave., Detroit, Mich.
New Ideal Wagon Works, 1845 Park Ave., New York, N. Y.
Press Sons, Jacob, Fulton and Halsted Sts., Chicago, Ill.
Shadbolt Mfg. Co., Flushing Ave. and Cumberland St., Brooklyn, N. Y.
Sior & Son, Heinrich, 245-47 Floyd St., Brooklyn, N. Y.
Wright Co., Thomas, 71-78 Colden St., Jersey City, N. J.

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Moreland ¾-tonner Rounds Out Distillate-burning Line



The new Moreland 1,500-pounder which burns distillate fuel

ROUNDING out a line of 1-, 1½-, 2½- and 4-ton trucks, the latest model of Moreland trucks, a ¾-tonner, follows the design of its older and larger brothers. The entire Moreland line, made by the Moreland Motor Truck Co., Los Angeles, Cal., has been thoroughly modernized. The new 1500-pounder has its motor under a hood forward of the dash, a unit powerplant, sheet metal radiator case and final worm drive.

The motor is a Wisconsin with cylinders cast in block and the valves at the right. It is equipped with the Moreland gasifier, a special device which permits California distillate to be used as a fuel. This is a low-gravity fuel which is much cheaper than gasoline.

Moreland ¾-Ton Specifications

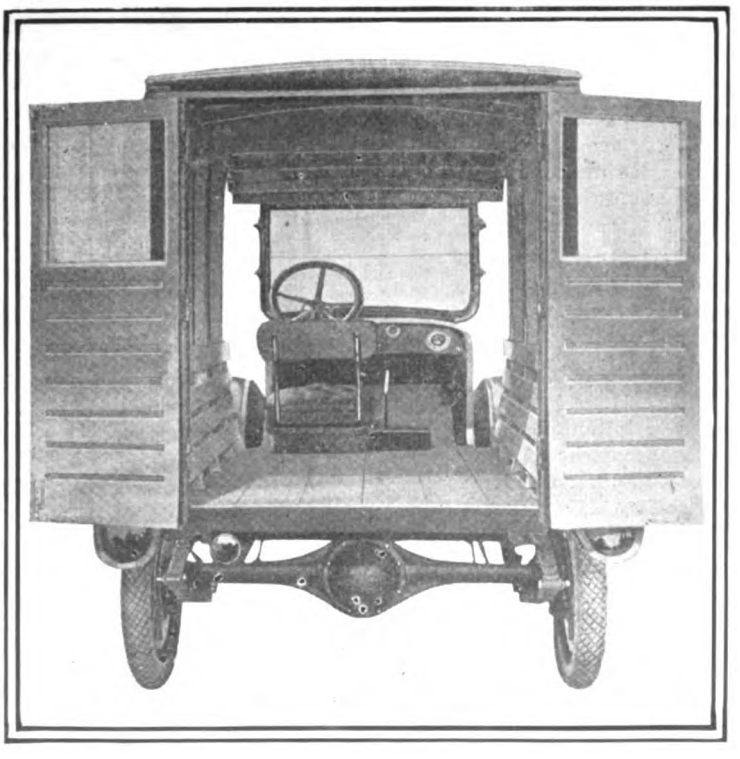
Capacity	1,500
Price	$990
Wheelbase	112
Tires, front	34 x 4½
Rear	34 x 4½
Motor, bore	3¼
Stroke	5
N. A. C. C. hp.	16.92
Speed, r.p.m.	1,100
M.p.h.	18
Gear-ratio in high gear	5.8-1
Final drive	Worm

Thermo-syphon water cooling is employed in conjunction with a cellular radiator with a sheet metal casing. Ignition is by high tension magneto, a Dixie with hand spark advance being used. No governor is fitted.

From the motor the power is delivered through a dry-plate clutch to a three-speed Brown-Lipe gearset in unit with the motor.

Final drive is by top worm of Timken manufacture. Both torque and propulsion are taken though the springs. Both front and rear springs are of the half-elliptic type.

Left steer is employed with the brake and gearset levers located in the center. The springs are Moreland-made. Pneumatic tires are used all around, mounted on Phineas Jones' wheels. The steering gear is of Lavine manufacture.



Rear view of the Briscoe ½-tonner showing the low position of the driver's seat with left steer and center control. Note the passenger car type of dash

3-tonner Gives Chase a Six-model Line

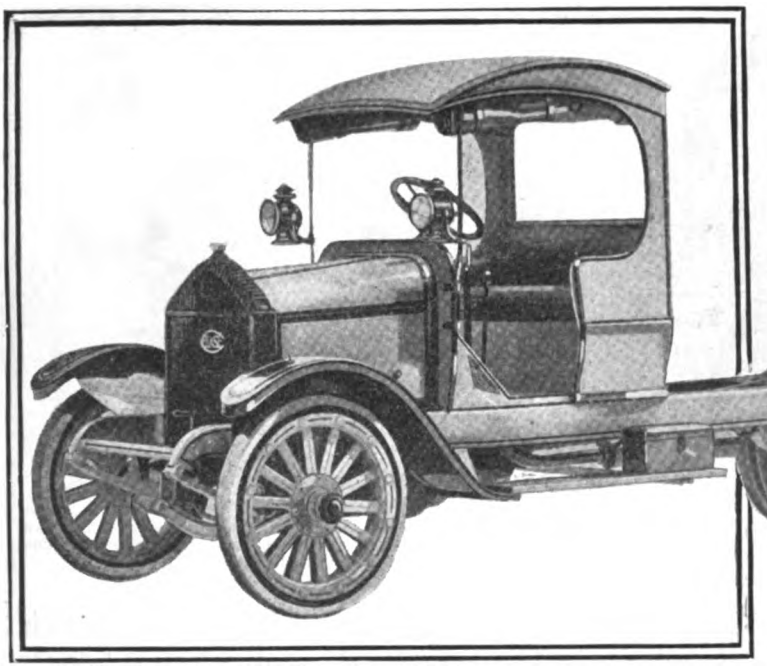
SUPPLEMENTING the Chase line of ¾-, 1-, 1½-, 2½- and 3½ ton models, the Chase Motor Truck Co., Syracuse, N. Y., has just brought out a 3-tonner which follows the general design of the previous models. In appearance it is almost identical with the 2½- and 3½-ton models except that, of course, the load-carrying parts are of slightly less strength than the latter and slightly greater than the former.

As in previous models of the Chase water-cooled line the motor is mounted conventionally under a hood forward of the dash and supported at three points in a unit powerplant assembly including the clutch and gearset. The motor is controlled by either hand or foot throttle. The motor is of the L-head design with cylinders cast in block. The water circulation is by centrifugal pump. A cast-case radiator with fins at the top is employed, the tubes being of the conventional finned type.

From the motor the drive is taken through a dry-multiple-disk clutch to a three speed selective sliding gear gearset in a unit with the motor. From the gearbox the drive is by a tubular propeller shaft with two universals to the worm-driven rear axle of Sheldon manufacture.

The rear springs are underslung as in the 2½- and 3½-ton models. The frame is of pressed steel of the semi-flexible

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Chase 3-ton Model Follows Previous Design

The Chase 3-tonner follows the lines of previous models

type, bottle-necked in front to give a short turning radius.

Ignition is on the single plan with a Bosch high-tension magneto and a fixed spark advance. The carbureter is gravity-feed from a tank beneath the seat.

Both sets of brakes operate on the rear wheels, acting internally on the same drums. The steering wheel is located at the right and the brake and gearbox levers in the center.

Wheels are of wood, although the Smith steel wheel can be supplied at a slight additional charge. Provision is also made for the employment of an electric lighting and starting unit which is furnished at an extra charge. The chassis is shown above fitted with a standard cab.

Chase 3-Ton Specifications

Capacity	6,000
Price	$2,800
Wheelbase	160
Tires, front	36 x 4
Rear	36 x 5 dual
Motor, bore	4 1/8
Stroke	5 1/2
N. A. C. C. hp.	27.20
Speed, r.p.m.	
M.p.h.	
Final drive	Worm

Briscoe 1,000-pounder Offered at $695

Price Includes Open Express Body

THE Briscoe 1000-pounder, made by the Briscoe Motor Corp., Jackson, Mich., is offered complete with an open express body at $695. It can also be obtained with a closed panel body as shown in the illustration on this and the opposite page.

The vehicle follows passenger car lines in the shape of the hood which is carried clear aft of the dash with a straight-line effect. No doors are fitted on the cab, although the sides of the dash are carried quite far aft, thus forming somewhat of a protection for the driver. Crowned fenders both front and rear add a touch of quality to the vehicle.

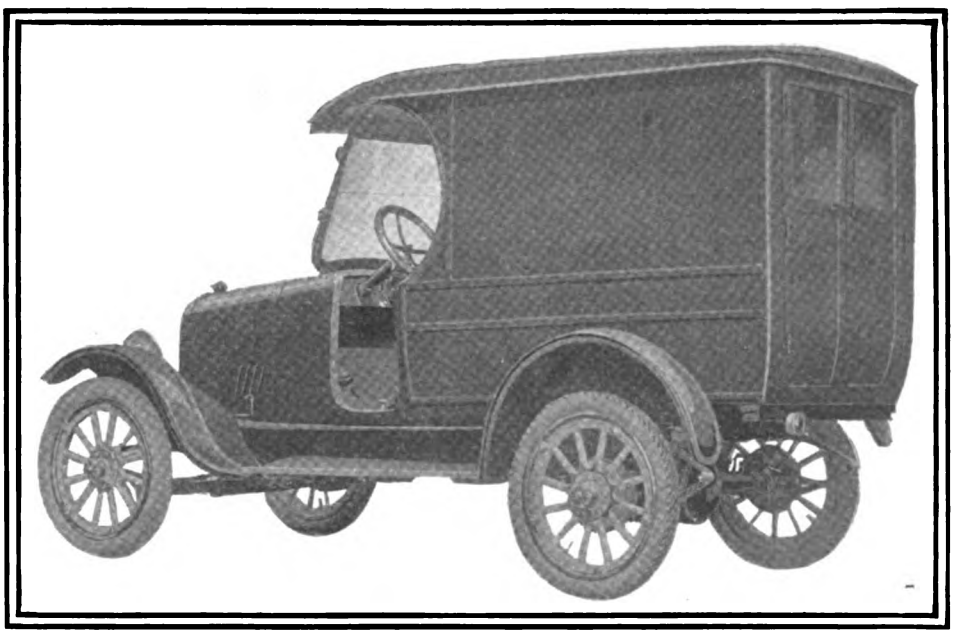
From the motor the drive is through a cone clutch to a three-speed selective sliding-gear gearbox in a unit with the bevel-driven rear axle.

Both front and rear springs are of the elliptic type. The frame is of pressed steel.

The engine has its four cylinders cast in block with the valves at the right. Water circulation is by thermo-syphon. The radiator has zig-zag tubes with a sheet metal case. Ignition is on the single plan, a storage battery being the source used in connection with a Connecticut distributor and coil. Left steer and center control are employed.

Briscoe Specifications

Capacity	1,000
Price, with body	$625
Wheelbase	104
Tires, front	30 x 3 1/2
Rear	30 x 3 1/2
Motor, bore	3 1/8
Stroke	5 1/4
N. A. C. C. hp	15.64
Speed, r.p.m.	
M.p.h.	
Final drive	Bevel



Side view of the Briscoe 1,000-pounder with standard panel body

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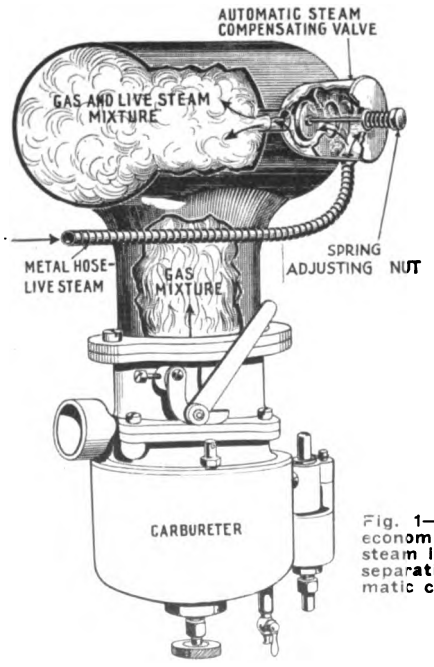
Accessories for the Truck

NEW WATER VAPOR GASOLINE ECONOMIZER

Operated through the suction of the motor, a device for injecting superheated steam or water vapor into the fuel mixture which differs from other similar types in that the vapor is taken from the radiator filler cap, has recently been put on the market by the Vapor Gasoline Economizer Company, New York City. As shown in Figs. 1 and 6, the device consists of a pipe attached to the bottom of the radiator overflow pipe; a separation valve at the bottom of the added pipe section and a length of flexible piping which is carried from the separation valve and around the exhaust manifold to a compensating valve screwed into the intake manifold above the carbureter.

As shown in the accompanying illustrations, the separation valve consists of a cylindrical chamber with two sets of concentric baffle plates, through which the steam and water from the radiator are forced to flow between the time they enter at the center of the bottom and the steam leaves from the center at the top. The course of the steam and water through the baffles tends to separate the water, which drops to the bottom and is carried off through an outlet at the bottom. The steam then flows upward through the flexible piping and is superheated during its passage through that portion of the piping wrapped around the exhaust manifold.

The steam then enters the compensating valve which consists of a cylindrical chamber with the disk valve and stem at its center. The stem extends out of the chamber and its provided with a spring to adjust the valve upon its seat. Due to the small suction during low and idling speeds of the motor, the valve spring is sufficiently strong to hold the valve to its seat, and accordingly no steam can enter the intake manifold. As the speed of the motor increases and likewise its suction, the valve is correspondingly opened, allowing a proportionate amount of steam to enter. The valve is adjustable by means of the exterior spring on its stem.



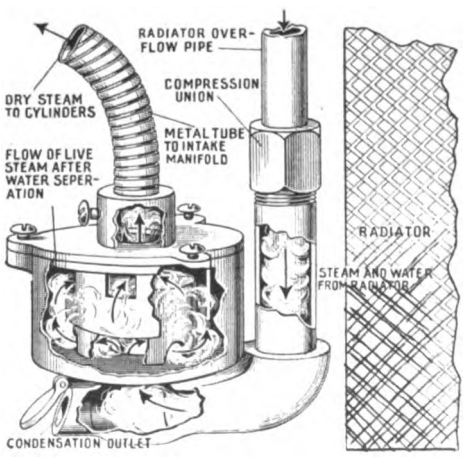
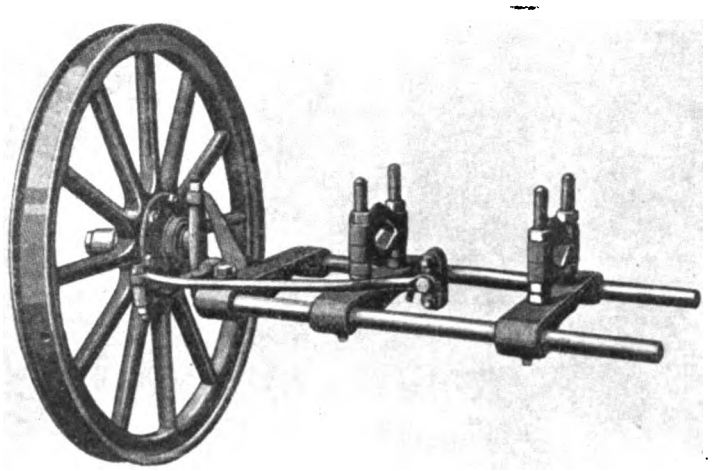


Fig. 1—Sectional views of the water vapor gasoline economizer which is designed to inject superheated steam into the fuel mixture of a gasoline motor. The separation valve is shown at the right and the automatic compensating valve which regulates the amount of steam admitted, at the left





Figs. 2 and 3—At the left, the Compo crutch, a device for aiding the towing of damaged vehicles. At the right, the Oxy-Ignitor spark plug which is featured by the shape of the sparking points of the central electrode

COMPO CRUTCH AIDS TOWING OF DAMAGED VEHICLES

Designed as an aid in towing damaged motor vehicles which have broken their axles or lost wheels, the Compo Crutch, shown in Fig. 2, is built for use in connection with either the front or rear axle of vehicles of not more than 2 tons weight. The device consists of a wheel carried on a conventional spindle, the support of which is attached to a horizontal bar which carries at each end a rod about 2 ft. long. Two distance arms made of flat pieces of iron bent over at their ends are slipped over the ends of the rods, forming trusses between the two. Each of these trusses is provided with vertical threaded bolts over which are slipped two-part V-jawed clamps. The wheel spindle is held in any desired rotative position by means of a conventional yoke and an arm clamped to one of the rods.

In fitting the device the top halves of the V-jawed clamps are removed and the two rods shoved in under the axle, be it front or rear. The truss pieces are then moved along the bars to positions where the upper halves of the clamps can be put on the top of the axle and then screwed down into place over the ends of the bolts on the trusses. The latter are held in position on the rods by means of small set-screws turned up tight against the rods. Due to the dirigibility of the trusses, the device can be adjusted to fit any make of vehicle. The apparatus is made by the Gearless Differential Co., Detroit, and is shown in Fig. 2. The wheel is fitted with a 3½-in. pneumatic tire, although the latter is not supplied as a part of the apparatus as sold.

McKAY DEMOUNTABLE RIM CLIPS

Characterized by the fact that they remain attached to the wood felloe of a motor vehicle wheel while its demountable pneumatic tire rim is being taken off or put on, McKay tire clips eliminate the use of wedge clips and the difficulty sometimes experienced in manipulating the wedges to exert equal pressure on the rim. The clips will fit any standard-sized bolt and may be applied to any wheel.

The clip, as shown in Fig. 4, consists of three parts, a rim plate, the clip proper and the nut for the holding bolt. The clip, which is bent over at right angles at the top to fit beneath the tire rim, is also bent up in the shape of a trough on the surface in contact with the flat side of the wood felloe. The clip proper is inserted in this trough, the sides holding it in its proper position. The clip, which has a notch on its inner side which contacts with the side of the rim, is slotted and provided with an inverted key-hole-shaped recess on the outside. This recess has two steps, that farthest from the outside face of the clip being as formed by two circles, the upper or smaller one having a diameter equal to that of the holding bolt and the lower one a diameter equal to that of a special circular flange on the bottom of the nut for the holding bolt.

In operation, the plate is slipped over the rim bolt, the clip put in place and pushed up tight by screwing up the nut. To loosen, the nut is unscrewed until the flange is out of its recess, at which time the clip drops down, the bolt slipping into the top of the slot and the nut

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flange into the top of the outer step of the recess. At this time the top of the clip is below the bottom edge of the rim so that the latter may be removed. The usual number of clips are used per wheel. The clip is made by the McKay Co., Cleveland, Ohio.

G.E. MERCURY-ARC RECTIFIER FOR SMALL BATTERIES

Designed for charging small storage batteries, such as those used for starting, lighting and ignition purposes, the new type of mercury-arc rectifier now offered by the General Electric Co., Schenectady, N. Y., is a small, compact unit, weighing approximately 15 lb., which can be operated from an ordinary lamp socket. As shown below in Fig. 5, the device consists of a metal base on which are mounted the necessary reactance coils and above them the mercury-arc bulb, which is unusual in shape, being almost globular in form. The latter is mounted on trunnions near the top for tilting to start the rectifying operation. The whole is covered by a perforated sheet-metal cover with a handle at the top for tilting. The rectifier is supplied with an attaching plug on a short length of covered wire. Two binding posts are provided, each distinctly marked plus or minus, from which wires are run to the battery or batteries to be charged.

The unit is designed to charge one three-cell, one six-cell or two three-cell batteries, as required. It may also be connected with one cell of a battery, and will charge it at the rate of approximately 6 amp. when on a 110-volt alternating-current supply. The rectifier can also be furnished for 133-, 60-, 50-, 40-, 30- or 25-cycle, 110-volt circuits.

The outside dimensions of the apparatus are: Length, 8½ in.; width, 6⅝ in., and height, 11 in. The total weight of the 60-cycle outfit is but 15 lb., thus rendering it very easily carried from place to place in a garage and making it unnecessary to remove the battery to be charged from the vehicle.

In operation the rectifier is first connected with the alternating-current supply line by means of the flexible lead furnished with the unit. Wires are then run to the battery to be charged from the binding posts on the instrument base. The alternating current is then turned on and the rectifier tipped by means of the handle on the top of the cover. This starts the rectification process and the charging of the battery with direct current. If two batteries are to be charged at once they should be connected in series.

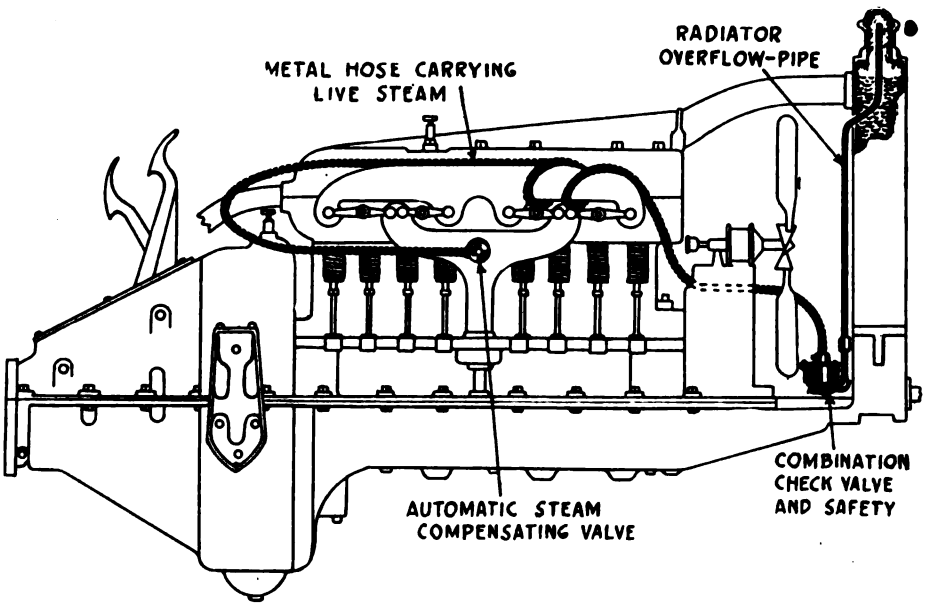


Fig. 6—The water vapor gasoline economizer shown as it is applied to the average gasoline motor. The details of the various parts of the device and how they work are illustrated in Fig. 1 on the opposite page

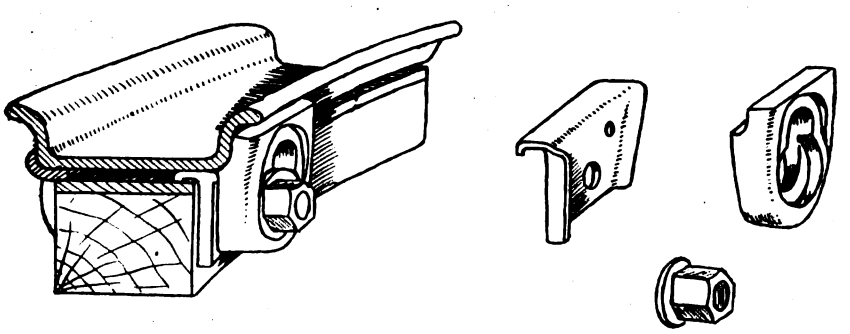


Fig. 4—The McKay demountable rim clip in its entirety and in its parts. The clip is characterized by the fact that it remains attached to the felloe while the demountable rim is being taken off or put on

OXY-IGNITOR SPARK PLUG

Differing from other plugs in the shape of its sparking points, the Oxy-Ignitor spark plug has a central electrode with four small bent-up U-shaped lips at the bottom, the sparks jumping from any one or all of the lips to the bottom of the shell, which is cone-shaped to give the required gap. Should any one of the lips be fouled by carbon the sparks can jump from the others, thus tending to insure a continuous spark.

The plug, formerly known as the O-G, is now made by the Oxygenerator Co., Chicago. It is shown in Fig. 3.

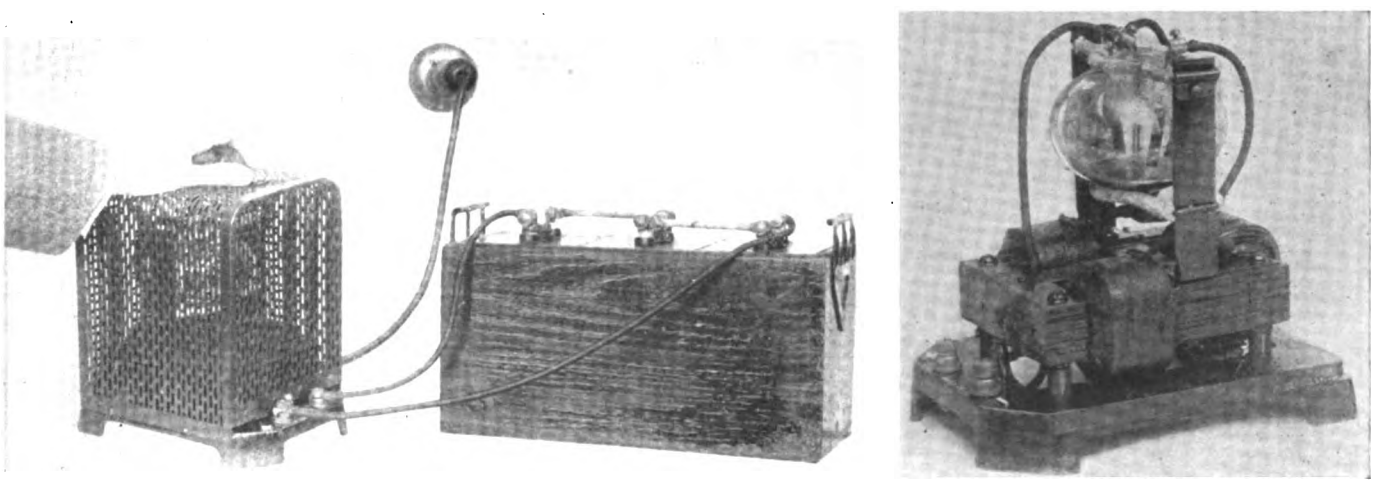


Fig. 5—The new General Electric mercury-arc rectifier designed for charging small storage batteries such as are used for lighting, ignition and starting purposes. At the left, the device is shown as it is used to charge the battery. The view at the right shows the almost globular mercury bulb and the reactance coils below it

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Men and Makers



STUDEBAKER CORP. has just increased the capacity of its forge shop at the Detroit factory by 35 per cent. A contract has just been let for a battery of nine steam hammers, together with all the necessary trimming presses, forging and heat-treating furnaces. This new equipment represents an investment of $150,000. According to present plans all of this new equipment is to be installed and in operation by Jan. 1, 1917. The Studebaker company will also erect a new foundry, 1100 by 150 ft. on the site now occupied by the lumber yards at the South Bend, Ind., works. The contracts for the work have been let to James Stewart & Co., Inc., engineers and contractors, of New York City and Chicago. The foundry will have four cupolas and a 250-ton daily melting capacity, and will be completed and ready for use by July 1, 1917. The machine shop will be about 900 ft. long by 300 ft. wide, and will furnish double the facilities of the existing shops. Only a portion of it will be erected at the present time, but the plans permit extensions as business requirements demand. These additions when completed will add 1000 men to the working force of the corporation, which will mean an increase of several thousands to the population of the city and a consequent demand for housing facilities.

The White Co., Cleveland, Ohio, is to add a $200,000 building to its present manufacturing facilities. It will consist of a one-story concrete and steel structure, 241 by 304 ft. and will be erected at the northeast corner of the present plant.

Atterbury Motor Car Co., Buffalo, N. Y., is rebuilding its factory recently destroyed by fire in that city. The estimated cost of the new building is $50,000.

Packard Motor Car Co. of Boston, Boston, Mass., is now erecting a new branch building in Worcester, Mass. It is being built of brick, concrete and steel and will have 142,000 sq. ft. of floor space. It is said to be the largest sales and service building in New England, with the exception of similar structures in Boston. It will be ready for occupancy Feb. 1, 1917. It is fitted up with the most modern equipment designed to give efficient motor vehicle service, and employs ramps instead of elevators between the main floor, level with the street, and the sub-basement. The building is 394 ft. by 70 ft., and has a capacity for 150 vehicles. It will be under the charge of Allen N. Davis as manager.

Studebaker Corp., Detroit, Mich., has commneced the erection of a service building in Columbus, Ohio. When completed the building will represent the expenditure of $40,000. It is the purpose of the builders to make this service station one of the finest in the country. The dimensions of the building will be 100 by 155 ft. The purpose of the station is to give service to Studebaker owners and purchasers. The building will be completed in 60 days.

New England Velie Co., Boston, Mass., which recently moved from Cambridge, Mass., to temporary quarters in Boston, has now moved into its permanent home at 1123 Commonwealth Avenue, where it has ample room to displav its trucks. There is a combined sales, stockroom and service department connected with the executive offices.

E. E. Wentworth Corp. has just finished a big structure at Houlton, Me., 105 by 63 ft., that will be a branch of its Portland agency for Overland delivery vehicles.

Brown-Lipe Gear Co., Svracuse, N. Y., recently purchased the Fayette Street plant of the John Deere Plow Co., of that city. The new purchase will enable the Brown-Lipe Co. to practically double its present capacity and will give it the entire block back of its present plant. The executive offices have already been moved into what were the executive offices of the plow company. The grinding department, control set department, tool room, rough stock department and the service branch are being removed from the old building into the new plant. The balance of the latter is being equipped with new machinery, and the entire new plant will be in full swing by Jan. 1, 1917.

Bosch Magneto Co., New York City, has further augmented the recent large addition to its Springfield, Mass., plant by another structure providing 60,000 sq. ft. of floor area. Ground has already been broken for the new building and its completion will be rushed as fast as possible. The factory is to be a one-story building with a saw-tooth type of roof. When completed more than 130,000 sq. ft. of manufacturing space will have been added to the Bosch works during 1916.

United States Light & Heat Corp. Buffalo, N. Y., has closed up its branch at Boston, Mass., and turned the business over to the Boice Perrine Co. as an agency.

Imperial Brass Mfg. Co., Chicago, has begun the construction of an addition to its present factory which will double its floor space. The present building contains 75,000 sq. ft. and the addition will contain an equal area, thus giving a total foundry space of 150.000 sq. ft. The new building will be of heavy mill construction and will be erected on an adjoining site at Harrison Street and Racine Avenue. Orders have been already placed for the new factory equipment. The company's present plant has been running day and night for several months without doing any war business.

Harvey Spring & Forging Co., Racine, Wis., has broken ground for the erection of a fireproof building of steel construction, 100 by 200 ft., to be used exclusively for forming and heat treating motor vehicle springs.

Edison Storage Battery Supply Co., Los Angeles, Cal., has opened a new office on the fourth floor of the San Fernando Building in that city. The new office will be under the charge of James F. Rogan, who has been acting as distributor for Edison storage batteries in that city. The Edison company also maintains two other offices on the Pacific coast. One is in San Francisco, Cal., in charge of District Manager E. M. Cutting, and another at Seattle, Wash., under F. C. Gibson as resident manager.

Lane Motor Truck Co., Kalamazoo, Mich., has completed its new factory, and will start on a large production within a short time. A large stock of parts has been ordered and the output will be marketed rapidly as soon as the new factory gets in full swing.

Electric Storage Battery Co., Philadelphia, the W. H. & Webster Jones Co., distributors of the Willard Storage battery, and the General Vehicle Co. have lately re-established themselves in new quarters in the Back Bay, Boston, in the growing motor vehicle district. The former occupies the ground floor of a



The Packard truck shown above bucked a railroad truck and emerged victor, as is shown by the overturned box-car. The truck, a 5-tonner owned by Fitzgerald Bros. Brewing Co., Troy, N. Y., was being unloaded and beer in kegs and bottles put into the overturned car at the left. The front wheels of the truck were resting on the side track at the right when, all of a sudden, several cars were backed down on the track by a switching engine. The first car struck the left corner of the truck at an angle, driving it back with such force against the car on the left track that it was turned completely over. The remarkable thing about this unusual accident was that the truck was none the worse for the experience except for a few minor fractures of motor, radiator and steering gear parts

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new building on Beacon Street, near its intersection with Commonwealth Avenue, and the General Vehicle Co. occupies the floor below, which is the street floor at 590 Commonwealth Avenue. In the building adjacent, the Jones Co. occupies the entire ground floor for storage battery charging, repair and sale. The Philadelphia concern has handsome office quarters, finished in natural oak, for Manager F. J. Stone and staff, and its laboratories care for about 250 batteries charging simultaneously. The General Vehicle Co.'s Boston office is in charge of Joseph A. Hussion.

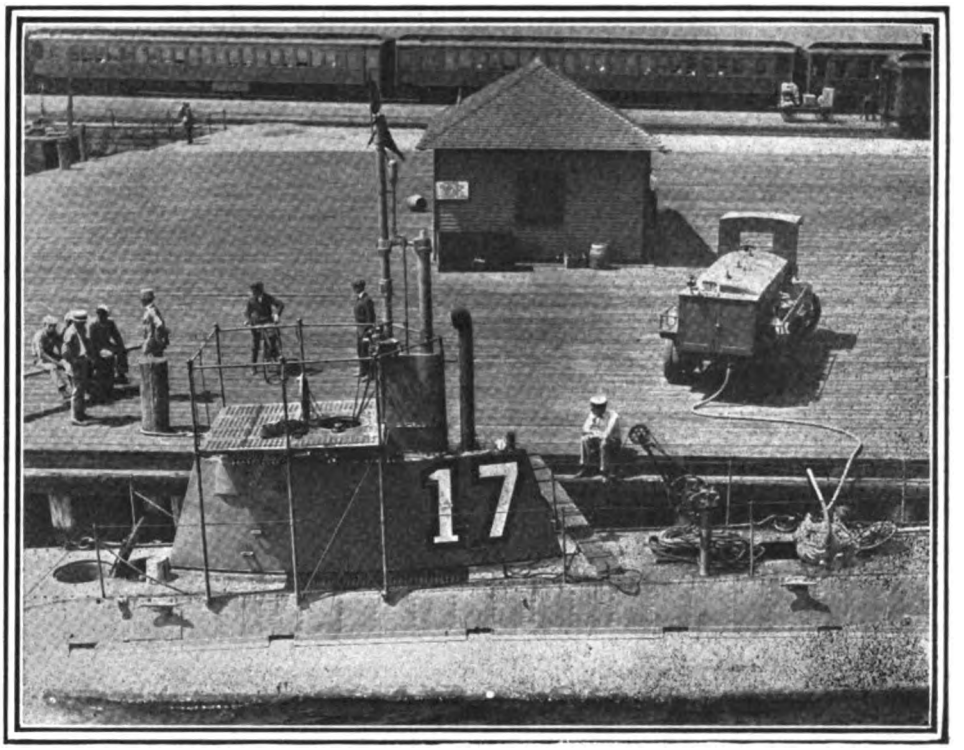
Goodyear Tire & Rubber Co., Akron, Ohio, is erecting a battery of five cooling towers to conserve the water supply which rotates its large water turbine. Each tower is equipped with a 12-ft. diameter rotary fan. This creates a current of cold air through which the overheated water coming from the turbine may pass and re-enter the turbine at the proper temperature. In this manner 12,500 gal. of water may be cooled each minute and used over again indefinitely. It is estimated that in a year the water wasted will amount to less than 5 per cent. This will effect a wonderful saving in the water consumption of the Goodyear plant and conserve the supply for other uses. Once the cooling system is filled with the required amount of water no more need be added except to replenish the small quantity escaping by evaporation.

New Goodyear Buildings Now Being Built require the services of 1250 men. The building operations now taking place include structures to provide more room for the office force as well as for the factory workers. The new factory structures will give the Goodyear company a much larger capacity, both for tires and for mechanical goods. One of the new buildings, plant No. 5, which is now nearing completion, is to be a purely mechanical goods factory. It will enable the manufacture of tires and mechanical goods to be separated and will make possible a greater tire capacity per day. When the new buildings are completed it is expected that the Goodyear working force will number 20,000 men.

The Firestone Kansas City Branch was opened on Sept. 14. The opening festivities were combined with a dealers' convention, which was attended by more than 500 men from the various points in the branch territories. The new structure is said to be the largest tire distribution depot in the Southwest. It is eight stories high and contains comprehensive shipping and storage facilities for all types of tires made by the Firestone Tire & Rubber Co., Akron, Ohio.

Miller Rubber Co., Akron, Ohio, has just issued the initial edition of its factory paper, entitled "Miller Talk." The paper is an eight-page sheet which will be issued monthly. It will contain news and information about the Miller factory and its workmen, including their factory pursuits as well as their athletic activities.

Stewart-Warner Speedometer Corp., Chicago, has begun work on the first of a large group of new iron and brass foundry buildings at the Warner works in Beloit, Wis. The work of moving the equipment of the present shops there to the enlarged main plant in Chicago has been completed. Henceforth the Beloit works will devote its attention to the manufacture of raw materials. The finishing, assembling and other final processes will be done at Chicago. The main unit of the new foundry will be 180 by 480 ft.



Very few people ever heard of a motor truck acting as an adjunct of a modern submarine, yet the picture shown above depicts how a gasoline tank truck served several of Uncle Sam's undersea fighters in the recent war game off the Atlantic coast. The illustration shows one of the landing piers adjacent to the tracks of the Central Vermont Railway at New London, Conn., where the submarines of the defending fleet took on their supplies of gasoline and oil preparatory to sailing out to sea in search of the make-believe enemy fleet which was seeking to discover an unprotected point along the coast and land an imaginary force of invasion. As shown, it was a simple matter for the truck to back up to the edge of the wharf and discharge the gasoline into the undersea boat's storage tanks by means of a rubber hose. This method eliminated much loss of time and the danger incident to storing the gasoline in tanks or barrels on the dock

H & N Carbureter Co., New York City, has purchased a new and completely-equipped plant at 138 West Avenue, Long Island City. The company will maintain and enlarge its present service station located at 38 West Sixty-second Street, New York City. The main office and retail sales department will remove from its present location at 1790 Broadway to 1675 Broadway on Oct. 1.

Bound Brook Oil-less Bearing Co., Bound Brook, N. J., is erecting a reinforced concrete addition, 50 by 100 ft., to its present plant No. 2. The new structure will be used for the manufacture of Nigrum impregnated wood bearings.

The Van Dorn Electric Tool Co., Cleveland, Ohio, has just completed its new concrete, steel and brick factory in that city, which will more than double its former output. The factory is partly two and partly three stories in height, and has an unusually large amount of glass surface, insuring sufficient light and ventilation. Railroad shipping facilities are provided by a spur from the Cleveland Belt Line Railroad, which extends along a loading platform at the rear of the plant. Although the site of the factory was secured in October, 1915, the plant has only lately been completed, due to the fact that the builders were considerably hampered by a shortage of labor and delayed deliveries of material. The moving of the company's equipment and offices was also somewhat delayed because of the fact that the change was made during the midst of the greatest rush of business the concern has ever experienced.

A Federal Sales Conference was held by the Federal Motor Truck Co., Detroit, last week at Cedar Point, Ohio. One hundred and fifty district managers and dealers from every state in the Union assembled in Detroit on Wednesday, Sept. 13. From there they took a steamer chartered for the purpose to Cedar Point, where they arrived at 6 o'clock that evening. Addresses and discussions by the executives and salesmen occupied the morning and afternoon business sessions held on Thursday in the large convention hall. Among the topics taken up were traffic research, sales promotion and advertising. The new 1917 models of Federal trucks were on display on Friday. A banquet on Friday evening closed the conference. This meeting was held in the grill room of The Breakers. The speakers were Chief Pitt of the Middletown, Conn., fire department, who came all the way from New England to tell Federal dealers how a Federal truck had saved his city $1,800 per year. E. St. Elmo Lewis spoke on salesmanship.

H. T. Boulden, formerly general sales manager of the Chase Motor Truck Co., Syracuse, N. Y., and now sales director of the Selden Truck Co., Rochester, N. Y., practised what he preaches when it came time to move his household effects from Syracuse to Rochester. Two 3½-ton Selden trucks were used to make the 93-mile run between the two cities. Both trucks were loaded and left Syracuse at 10 o'clock in the morning, arriving in Rochester at 8:30 p. m. the same night. An accurate record of the cost of the job was kept and the result proved that not only was it cheaper and quicker to ship by truck but the condition of the furniture at the destination was better without the necessity of crating.

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R. F. Russell has resigned as production engineer of the Bessemer Motor Truck Co., Grove City, Pa., to become identified with the Air Reduction Co., New York City. Mr. Russell had been connected with the Bessemer Co. for the past 3 years.

Lewis H. Bill, general manager of the Nash Motors Co., Kenosha, Wis., formerly the Jos. B. Jeffery Co., resigned his position on Oct. 1. He expects to return to his home in San Francisco, Cal.

Henry Farrington, formerly connected with the Thomas B. Jefferv Co., now the Nash Motors Co., Kenosha, Wis., has become identified with H. Paulman & Co., Chicago, distributor of Pierce-Arrow trucks in that territory.

Jerry DeCou, general factory manager of the Nash Motors Co., Kenosha, Wis., formerly the Thos. B. Jeffery Co., resigned his position on Sept. 15, and is succeeded by John Bjorm, formerly superintendent.

W. I. Shaw, formerly sales manager of the Kentucky Wagon Mfg. Co., Louisville, Ky., has been made general sales manager of the concern and will take on the additional duties pertaining to the management of the business.

Frank H. Holman has been appointed sales manager of the Old Hickory gasoline truck department of the Kentucky Wagon Mfg. Co., Louisville, Ky.

Stephen K. Miller, formerly assistant sales manager of the Kentucky Wagon Mfg. Co., Louisville, Ky., has been appointed sales manager of the wagon department of the concern and will handle the sales of all farm wagons and agricultural machinery manufactured by the Kentucky company.

V. K. McBride, a member of the sales department of the Federal Motor Truck Co., Detroit, for the last 2 years, has recently been appointed sales manager for the same concern.

H. A. Conlon has been promoted from the position of district sales representative of the Federal Motor Truck Co., Detroit, to the field sales manager of the same company.

M. D. Kidder, for the past 2 years wholesale manager for the Reo Motor Car Co., and the Reo Motor Truck Co., and before that, eastern sales manager, has taken over the Maine territory for himself on an agency basis with headquarters at Portland, Me.

S. B. Howard, formerly Eastern and foreign representative of the General Motors Co., has been appointed New England sales manager of the Denneen Motor Co., Cleveland, Ohio, maker of the Denmo truck.

E. P. Strang, formerly with the Kirk-Latty Mfg. Co., Cleveland, Ohio, has been appointed Middle Western sales manager of the Denneen Motor Co., Cleveland, Ohio, producer of the Denmo truck.

Herbert H. Murden on Sept. 14 resigned his position as general manager and engineer of the Knickerbocker Motor Truck Mfg. Co., New York City, and is now affiliated with Oliver Bros., purchasing agents in the same city.

Murray Irwin has resigned his position as general manager of the Adams Truck Foundry & Machine Co., Findlay, Ohio. He has joined the forces of the Allen Motor Truck Co., Fostoria, Ohio.

D. E. French, Danville, Ill., has been placed in charge of the newly-established branch of the Packard Motor Car Co. in that city, and will have charge of the distribution for ten counties of eastern Illinois. His offices will be in the Baum Building. A service station will be maintained in the Jones garage.

Franklin G. Hubbard has resigned as chief engineer of the Hawthorne, Ill., plant of the Western Electric Co. He has become vice president, a stockholder and a director of the H. E. Harris Engineering Co., Bridgeport, Conn.

Connell & McKone Co., eastern Massachusetts agents for the Overland, has opened a large salesroom on Commonwealth Avenue, Boston, Mass., where it can market new and used vehicles. The building has a 60-ft. frontage and a depth of 125 ft. There is 28 ft. headroom from floor to ceiling and no posts.

P. J. McKinney, for many years with the Peerless agency at Boston, Mass., has moved to Manchester, N. H., where he will direct the sales of Peerless trucks in Maine and New Hampshire, having taken the agency himself.

G. H. Paddock, Springfield, Mass., has formed the Paddock Motor Co. in that city and will handle the Kisselkar truck line. He has secured salesrooms and service quarters at Pine and Central Streets.

Clutterbuck Bros., Sydney, Australia, will represent and handle the Velie line in that country. The arrangement was closed between the Velie Motor Vehicle Co. and Andrew Robinson, representing Clutterbuck Bros. in Moline, Ill., on Sept. 16.

J. W. Baker, formerly connected with the Vim Motor Truck Sales Co., Columbus, Ohio, has taken the central Ohio agency for the Acme line of motor trucks. The salesrooms are located at Front and State Streets.

Horace S. Putney, formerly with the Noyes Buick Co., at Manchester, N. H., has joined the Hanover Street Garage Co., as sales manager to sell G. M. C. trucks.

Officers of the Torbensen Axle Co., Cleveland, Ohio, were elected at a meeting of the stockholders of the concern on Sept. 13, as follows: V. V. Torbensen, president; W. J. Baxter, vice-president; J. O. Eaton, treasurer, and A. H. Ide, secretary. Besides these officials, W. F. Rockwell has been appointed work manager; R. A. Bruce, sales manager, and T. I. Ochs, purchasing agent.

Sven Winquist of Gothenburg, Sweden, inventor of the S. K. F. ball bearing, visited the new American factory of the S. K. F. Company at Hartford, Conn., on Saturday, Sept. 23. He was much impressed with the facilities of the new plant and the quality of the work turned out. As soon as Mr. Winquist and his party had finished its inspection of the factory, the former had a notice posted stating that in appreciation of the excellent work done by the men during the past few months, Saturday Sept. 30, would be a holiday for the entire factory force with full pay.

Harold Hemenway, East Moline, Ill., has been appointed general superintendent of the Beloit, Wis., works of the Stewart-Warner Speedometer Corp., Chicago, succeeding A. E. Moon, who has been promoted to an executive position with the same company in Chicago.

H. A. Fitzjohn has been appointed purchasing agent of the Springfield Body Corp., Detroit. He was formerly production manager at the Muskegon, Mich., plant of the Continental Motors Co., and is succeeded there by his former assistant, F. W. Sutton.

L. H. Earle and G. A. Boggs, who resigned from the Continental Motors Co. last July, have formed a company of their own under the name of Earl & Boggs to act as manufacturers' representatives for material. Offices have been taken at 1790 Broadway and accounts have been opened with the Pierce Governor Co. and the Blood Bros. Machine Co.

W. W. Pennington, formerly manager of the Kansas City, Mo., office of the United States Light & Heat Corp., Niagara Falls, N. Y., has succeeded C. R. Forth as manager of the Detroit office of the same concern.

Charles Hatch, sales representative of the Perfection Spring Co., Cleveland, Ohio, for the past 8 years, has been made sales manager of the same concern and appointed a member of the executive committee.

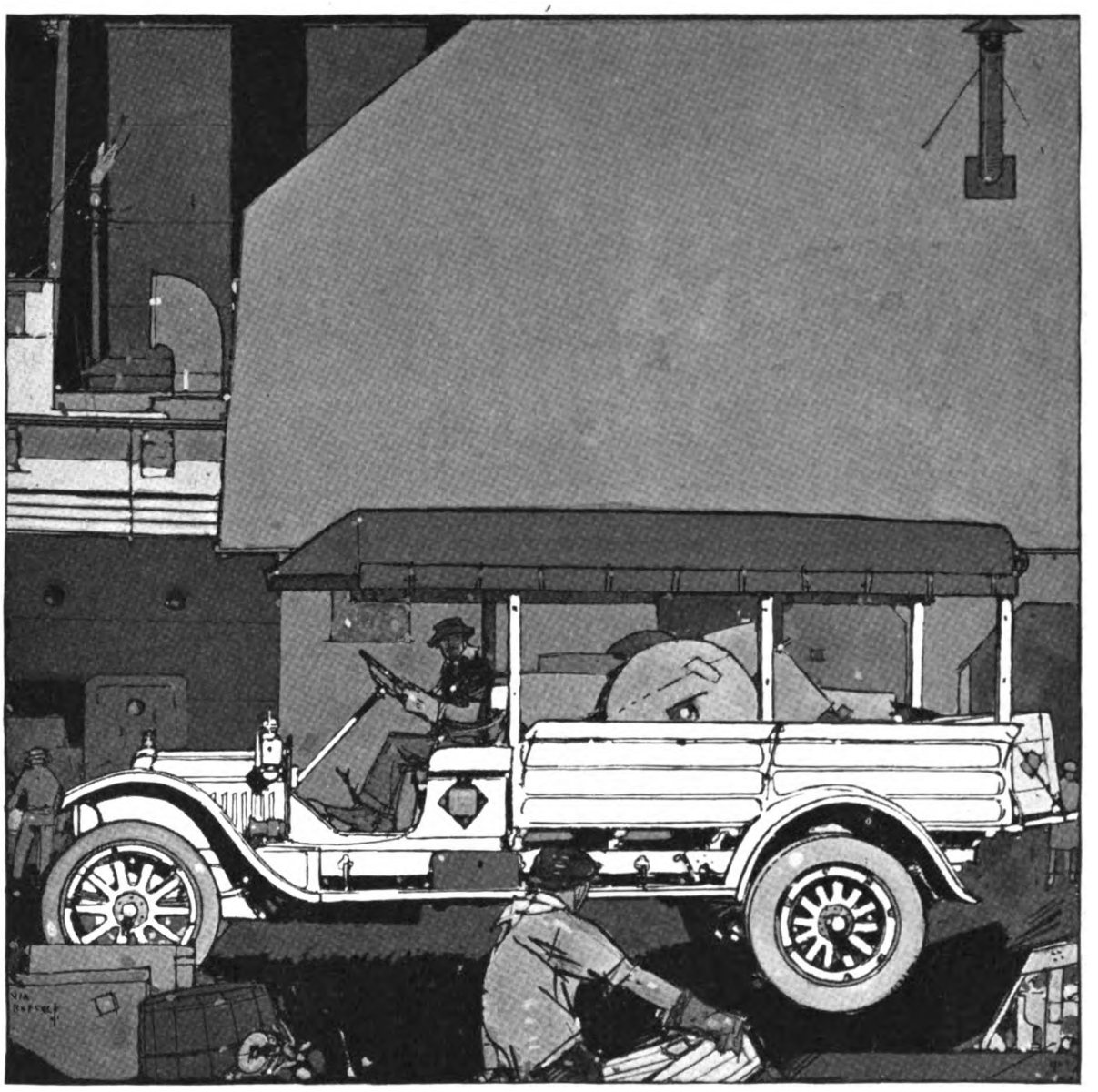
The Goodyear Field and Track Meet held at Seiberling Park, a 40-acre track within the grounds set aside by the Goodyear Tire & Rubber Co., Akron, Ohio, for its employes' homes, was a great success and attracted more than 40,000 spectators. More than 100,000 persons competed for supremacy in their respective branches of sport. The day opened with a baseball game between the Akron and Boston Goodyear teams. This was won by the Akron aggregation. While the game was in progress boxing and wrestling events were conducted in two other separate rings. There were races of all descriptions for the ladies as well as the men. Fancy diving, greased pole climbs, quoits, tennis, baitcasting, baseball throwing, obstacle races, nail driving, trap shooting, checkers, cock fights, clock golf, egg races, hurdles, jumps of all kinds, shot puts, bicycle races, sack races, relay races, dashes and greased pig chases were some of the events which entertained the throng throughout the day. Following the athletic events at the close of the day a monster display of fireworks was set off on the baseball field. The evening closed with a prize waltz.

F. Hallett Lovell, Jr., president and principal owner of the Lovell-McConnell Mfg. Co., Newark, N. J., maker of the Klaxon horn, has sold his interest in the concern to the United Motors Co., and will retire from all active participation in the affairs of his former concern. With Mr. Lovell's retirement the name of the Lovell-McConnell Mfg. Co. will be changed to the Klaxon Co. D. A. McConnell, who has been vice president since the company was organized, will now become president; Otis C. Friend will be the new vice president and Walter P. Coughlan, who has been secretary, will become secretary and treasurer. While Mr. Lovell will remain as a director of the new Klaxon company, his time will be chiefly devoted to the other manufacturing concerns in which he is interested. Among these is F. H. Lovell & Co., Arlington, N. J., makers of marine and railway supplies, of which he is president and principal owner.

Kenneth Skinner has sold his interest in the Micro Piston Ring Co., New York City, and resigned as secretary of the concern. He has gone into business as a manufacturers' representative under the firm name of the Auto Appliance Co., 1960 Broadway, where he represents the G. H. Dyer Co., Cambridge, Mass., and the Asbestos & Rubber Works Co. of New Jersey, Camden, N. J.

The "Bowser Booster" is the name of a new publication of the S. F. Bowser Tank & Pump Co., Fort Wayne, Ind. The paper is intended to deal entirely with the activities of the factory and office, as the "Bowser Boomer" is printed in the interests of the salesmen.

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WHITE TRUCKS

Pre-eminent in the Hardest Service

WHITE Trucks predominate in every line of business. But they are pre-eminent in road-making and in department store service—known to be the two most drastic types of motor truck service—one involving the hardest pull; the other the most constant duty.

THE WHITE COMPANY
CLEVELAND

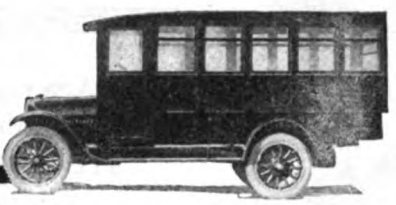
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STUDEBAKER

Commercial Cars



This new 16-passenger Studebaker 'Bus at $1400 is another example of the opportunity that a dealer has when selling Studebaker Commercial Cars. It is only one of the SIX Studebaker Commercial Cars.

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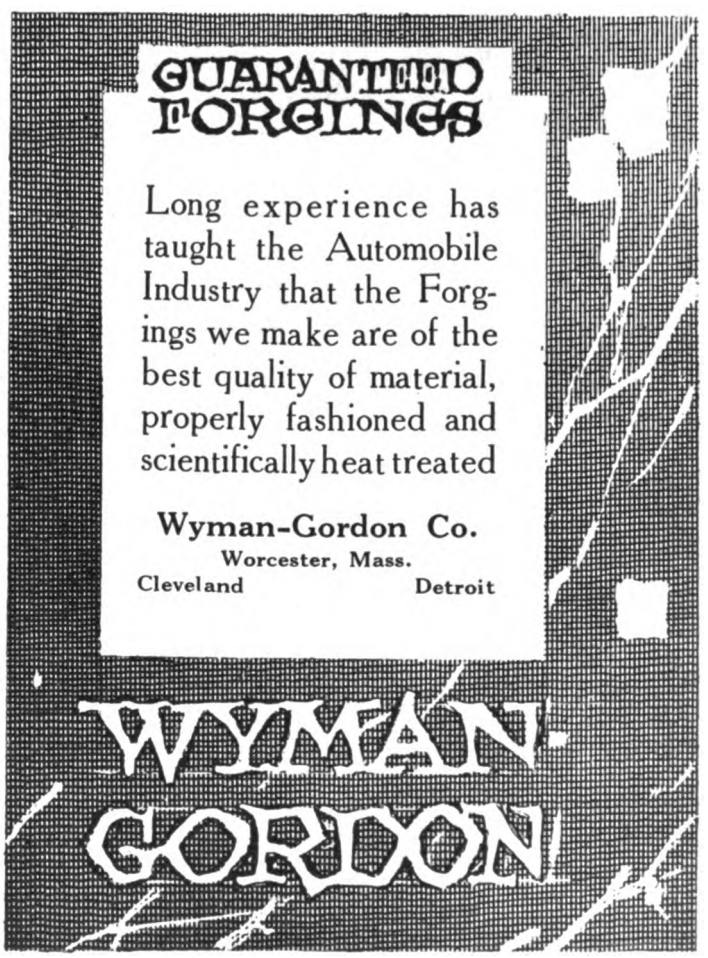
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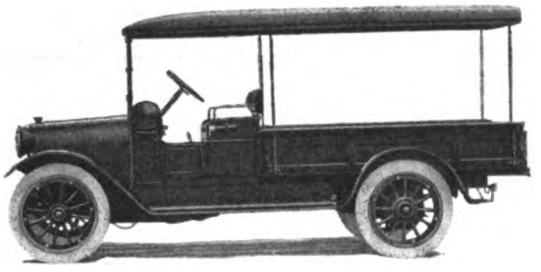
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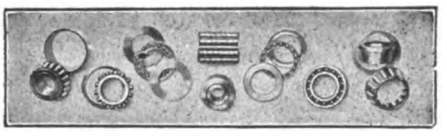


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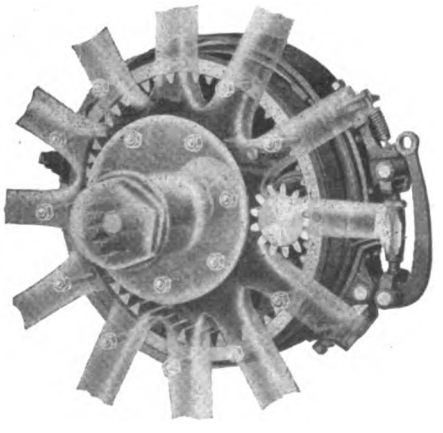
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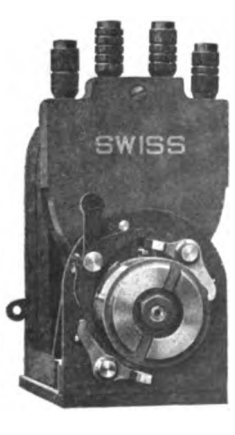
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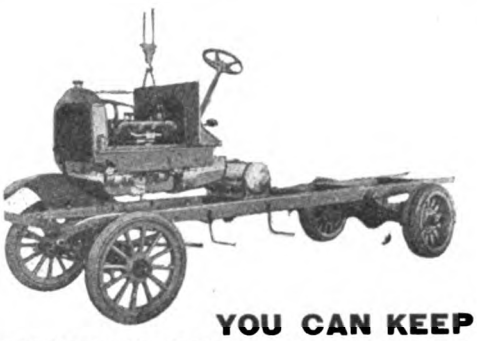
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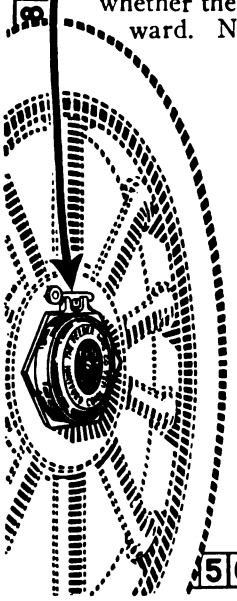
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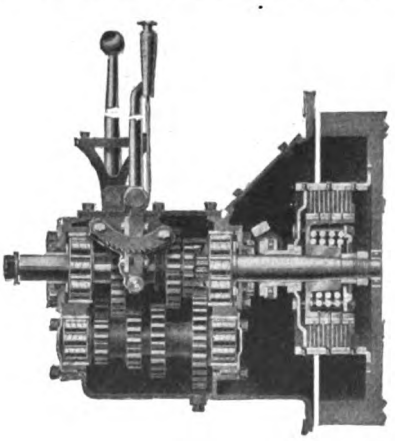
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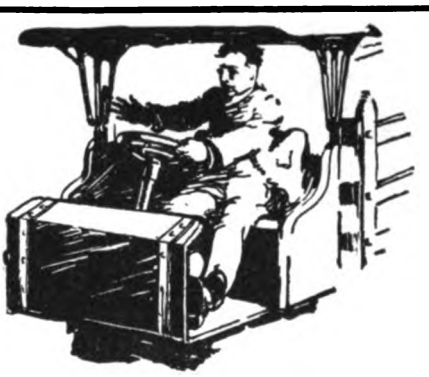
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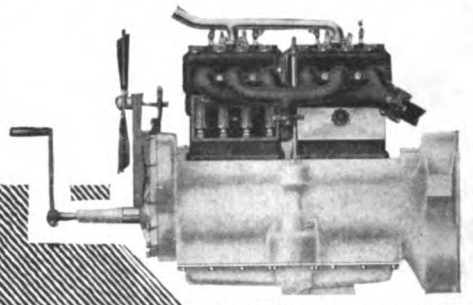
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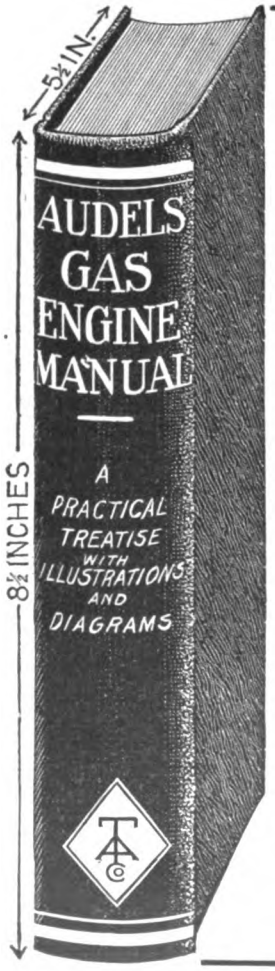
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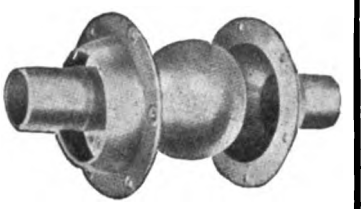
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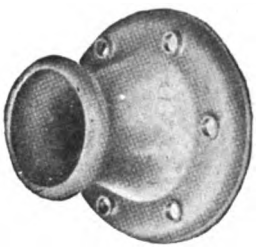


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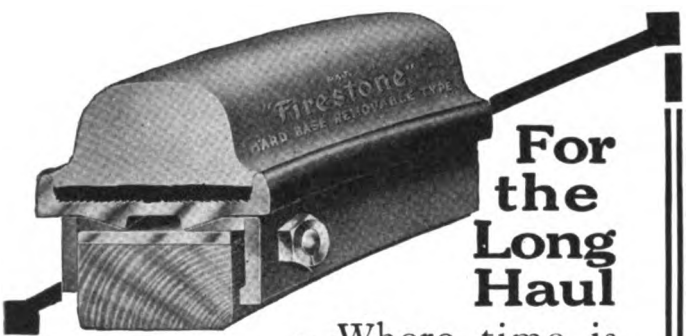
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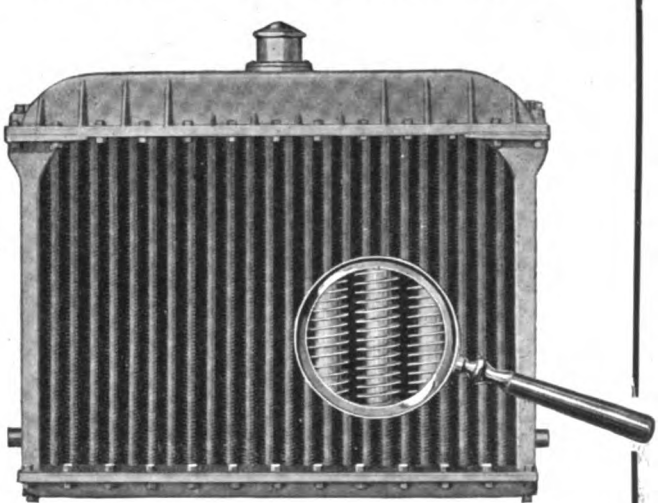
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For Diamond, Baldwin and Whitney Chains

Differentials

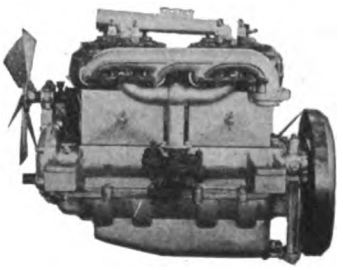
Sprockets in stock and to order

Send for Catalog

Cullman Wheel Co.

1350 Allgeld Street

CHICAGO



Beaver Motors Make Their Way By The Way They Are Made

BEAVER MOTORS are made by truck motor **specialists.** The concentrated experience of engineers of international reputation is embodied in their construction.

BEAVER TRUCK MOTORS are made by men who make nothing but motors—who, by doing the same thing over and over have become masters in perfection. That is why we can make truck motors better, quicker, and at less cost than the truck manufacturer himself.

We make truck motors of all sizes, for all requirements. No matter whether you are building a 1,500 pound light delivery wagon or a 5-ton truck, we can meet your demands for power, economy and dependability.

Do not determine on a motor for your truck till you have sent us your specifications

BEAVER MFG. COMPANY

Milwaukee **Wisconsin**

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Russel
Internal Gear Drive Axles

SELLING trucks these days is not difficult, for the industries of the country are awakening to the advantages of motorized delivery.
Make your sales even easier by using trucks driven by the Russel Internal Gear Drive Axle.
Industrial preparedness demands that the most serviceable, durable and efficient form of truck haulage be adopted by you.

Adopt, therefore, a truck using The Russel Internal Gear Drive Axle

Russel Motor Axle Co., North Detroit

Garford
MOTOR TRUCKS

Garford Trucks range from one ton to six tons in capacity.

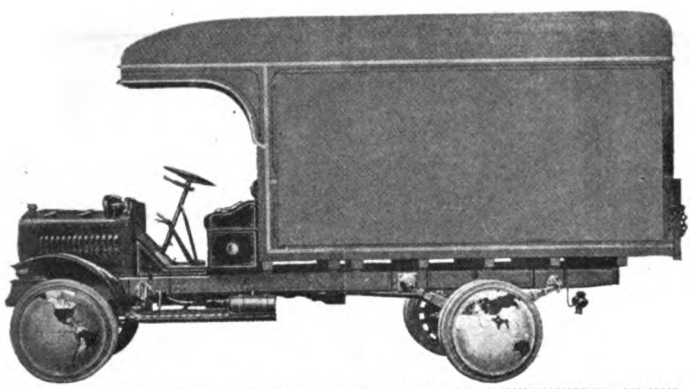
They are designed and built by men who have spent their lives in the study of motor trucks.

They are backed by one of the strongest organizations in the industry.

Bodies are provided to meet all requirements.

Write for catalog. Please address Dept. 103

The Garford Motor Truck Co., Lima.O.

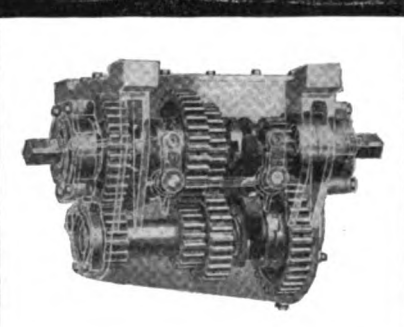


WICHITA TRUCKS
Dependability Plus Extensive Service
ARE YOU THE DEALER

who can put into your salesmanship WICHITA Energy and Spirit and back up your selling accomplishments with WICHITA Service?
If you are such a dealer, we have an interesting selling plan that you will not want to miss considering.
The faithful co-operation of our factory organization will give you encouraging help.
We want live dealers NOW—Men who will interest concerns in our heavy-duty trucks, and then to not let up on them until they sell them.
Request us to immediately submit our plans.

WICHITA FALLS MOTOR COMPANY
Arthur Boulevard, Wichita Falls, Texas

COTTA TRANSMISSIONS



All Gears Always in Mesh

An Assurance of Dependable Service

The Cotta Transmission Co.
Rockford, Ill.

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Krebs

"The Truck That Thinks"

The ideal commercial truck possesses four essentials — Simplicity — Low Maintenance Cost—High Efficiency and Absolute Dependability—That's the KREBS.

It is powerful, economical and needs no mechanic to drive it. The driver has nothing to do but steer.

The KREBS Automatic Governor positively keeps the motor at a certain speed and is assurance against the results of reckless driving.

Continental Motor, Timken Axles, Special economical KREBS Carburetor, Timken-Brown Worm Drive — are a few of the important essentials.

In ¾, 1, 2, 3, and 3½ ton capacities with bodies for any business.

Send for catalog—it will show you why you need the KREBS —the most efficient truck in the world.

The Krebs Commercial Car Co.
CLYDE, OHIO, U. S. A.

M&S DIFFERENTIAL

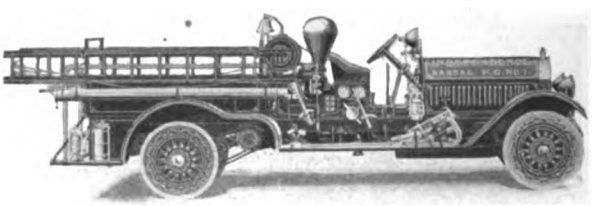
THE success of the M & S on the Jeffery Quad and the overwhelming evidence of severest tests long since established "the differential that pulls both wheels" as the ideal one for commercial motor vehicles.

Write for interview or send in your specifications.

M & S GEAR COMPANY
166 Lycaste Street
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FIRE!



SOUTH BEND DOUBLE DUTY FIRE APPARATUS

Built for SERVICE

Reliability and Efficiency

SOUTH BEND MOTOR CAR WORKS
SOUTH BEND, IND.

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BROWN-LIPE

transmissions and differentials represent the maximum from a standpoint of effiency and durability.

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Differentials Transmissions

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R & M Conform Piston Rings



Minimize Friction — Maintain Compression

Preserve Power — Reduce Wear

Succeed Under Hardest Tests

R & M Conform Piston Rings have a record of success extending from racing cars to hardest-worked commercial cars. Make good under all conditions.

3-part construction—the bull ring V-shape, and 2 conform rings of corresponding angles, permitting one to ride on the other.

Absolutely compression tight. Try them on one truck. You will want them for your entire fleet. **Write today.** Specially interesting proposition for manufacturers.

Modern Electric & Machine Co.
INDIANAPOLIS, INDIANA

DIAMOND T TRUCKS

Diamond T Service is as thoroughly built into our ¾-ton trucks, the smallest of the line, as it is in our 3½ ton model.

Its low cost is made possible only by its wide popularity which has enabled us to produce this model in enormous quantities. There has been no cheapening of quality or inferior workmanship permitted in its design or construction.

For a thousand uses it is the most satisfactory and economical delivery vehicle ever marketed. With a body suited to your requirements, it will improve your delivery service while lessening your operation expense.

Write to-day for catalog.

Diamond T Motor Car Co., Chicago, Ill.



U. S. BALL BEARINGS ASSURE PERFECT SERVICE

The engineering accuracy of U. S. Ball Bearings insures perfect bearing service.

Every piece of steel used in the manufacture of bearings must pass our test for chemical and physical properties and be approved by our laboratory before being allowed to enter our Production Department.

Each ball must be true in size and spherical to within one ten-thousandth part of an inch to be used in our bearings.

Equipped with the most exact measuring devices, together with our ideal to produce perfect bearings, every precaution is taken to assure ourselves that nothing but the highest quality goods leave our factory.

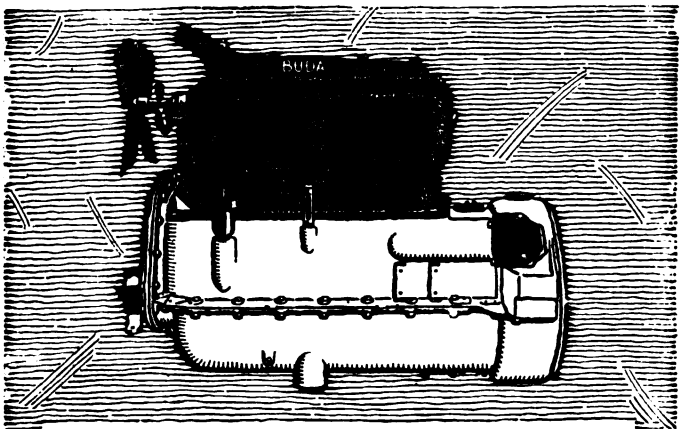
U. S. Ball Bearings are built to meet every possible radial, combined and thrust load. Write for catalog F. It will give you detailed information.

U. S. BALL BEARING MFG. CO.
(Conrad Patent Licensee)
Palmer St. and Kolmar Ave. Chicago

U S.
Trade Mark

U.S. Made for U.S. Trade

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The Fine Product of 35 Earnest Years

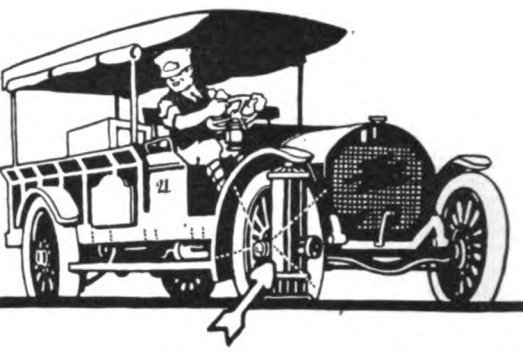
The Buda Motor is acknowledged the standard in its field. Its unequalled record is the result of the Buda Company's 35-year policy, "Performance, not Price."

BUDA TRUCK MOTOR

The presence of the Buda Motor in truck or pleasure car is a guarantee of quality in the vehicle through the strength of the Buda Company behind it. But, still more is it a guarantee because it is a piece of *fine machinery,* which *does its work* superbly—day after day, year after year. You will find it in many of America's greatest trucks.

THE BUDA COMPANY
Harvey Chicago Suburb Illinois

THE BUDA COMPANY BUDA MOTOR The part to buy the car by ESTABLISHED 1881



It can't be done!

You can break a fire-plug. You can break your truck. But you can't break the

DREADNOUGHT
TRADE *Indestructible* MARK
Hub Odometer

If you can, we'll send you a new one free. The Dreadnought gives accurate, uninterrupted mileage records and enables you to stop the leaks in your deliveries. Figures always right-side up—never hidden by grease or dust.

Write for booklet and prices.

AMERICAN TAXIMETER COMPANY
Manufacturers of Jones and Popp Taximeters
1765 Broadway New York City

DON'T

throw your old bearings away just because they are worn or broken.

We regrind the raceways (without drawing the temper) insert new balls and retainer AT about one-fifth the cost of a new bearing.

Any broken or worn bearing can be exchanged at any of our service stations, for reground bearings of any type or make, which are guaranteed equal to new.

These stations also carry complete stocks of New Single Row Annular, Thrust, NEW DOUBLE Row and Radax Bearings.

Write for Catalogue "U" and further information

Ahlberg Bearing Company
2636 Michigan Avenue Chicago, Ill.

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Boston, 93 Massachusetts Ave. — St. Louis, 2831 Locust St.
Detroit, 790 Woodward Ave. — Los Angeles, 325 W. Pico St.
Minneapolis, 926 Marquette Ave.

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ONE TRUCK SELLS THIRTEEN

THE above illustration is one of a fleet of twenty MACK trucks in the service of the Metropolitan Coal Company of Boston and its subsidiary branches.

Their first

Mack

Worm Drive Truck

purchased in January of this year, made such a wonderful record in the worst snow storms and under the worst road conditions that Boston has ever experienced, that the company decided to standardize on MACK trucks.

Thirteen more MACK one and one-half ton dump trucks have been ordered already.

Incidentally it is a pretty good stroke of business for our Boston representative.

Write for particulars.

THE INTERNATIONAL MOTOR COMPANY
West End Ave. and 64th St.
New York City

ACME Worm Drive Trucks are sales-makers, sales clinchers. They create and close business!



2-Ton Worm Drive ACME Chassis equipped, $2100
1-Ton Worm Drive ACME Chassis equipped, $1500

ACME THE TRUCK OF PROVED UNITS

A Fast-Sales Opportunity For Live Dealers!

And a **BIG-PROFITS** opportunity! Here is a truck line to meet the majority demand—trucks of right capacities and oversize dimensions—impressive-looking, sure-service **worm drive** trucks. Show **ACME** Trucks and you get "the signature on the dotted line." They are **easy** to sell. Fifteen famous features place their efficiency beyond all doubt and comparison:

Continental Motor	Warner Clutch	Rayfield Carburetor
Timken Worm Drive	Warner Transmission	Gemmer Steering Gear
Timken Front Axle	Detroit Springs	Smith Pressed Steel Frame
Timken Rear Axle	Long Radiator	Pierce Governor
Timken Bearings	Eisemann Magneto	Stewart Vacuum System

Quick Deliveries!

—the kind you can depend on. Our production keeps pace with all contract requirements. **ACME** Dealers never wait for trucks—never delay or lose sales on this account. This feature alone is **big**—means **sure profits** to the dealer—**insures his sales!!** You want this kind of factory co-operation.

Write for Agency Offer!

—or if you are located nearby, send the Coupon. Learn how you can double and treble your business with ACME Worm-Drive Trucks.

Get our unusual **profit-proposition.** If your territory happens to be open, here is a great chance to secure the agency. Learn of our co-operative plan of building your business. Act now! Address—

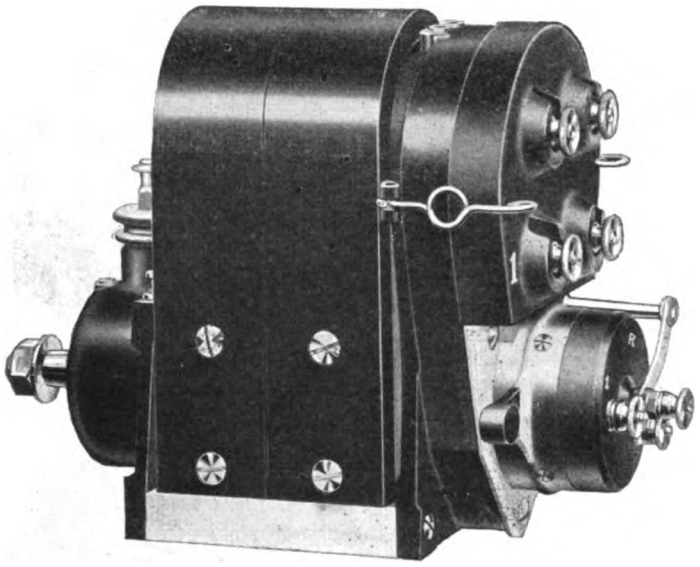
Cadillac Auto Truck Company
110 Mitchell Street
CADILLAC, MICHIGAN

CADILLAC AUTO TRUCK COMPANY
110 Mitchell St.
Cadillac, Mich.

Please supply complete information about the ACME 2 Ton and 1 Ton Trucks and Blank Agency Contract, with full details of your attractive offer for progressive representation in this territory.

Firm Name.....
Individual Name.....
Address .....
Town ..... State.....
Present Agent for.....

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NEW DEPARTURE BALL BEARINGS

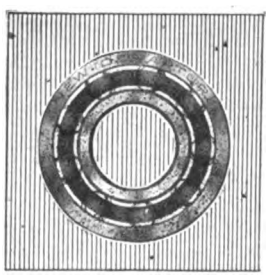
American Made for American Trade

contribute a large measure of efficiency to many present day power plant auxiliaries.

As the new models appear, more and more of this apparatus will be found equipped throughout with New Departures.

How these power saving Ball Bearings are made and what they accomplish in actual service, is entertainingly told in our book entitled "Ball Bearings in Commercial Applications."

Send for a copy.



MAGNETO TYPE

The New Departure Mfg. Co.

Bristol, Conn., U. S. A.

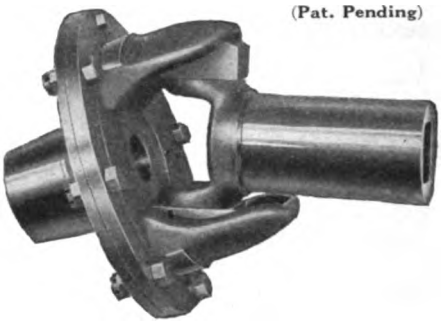
Conrad Patent Licensee

Western Branch: 818-20 Ford Bldg., Detroit, Mich.

Distributors in Trade Centers Throughout the United States
Sole British Agents: Brown Bros., Ltd., London and Manchester
Continental Europe: Jacob Holst, Copenhagen, Denmark

"Evans" Universal Joint

(Pat. Pending)



VIEW WITHOUT HOUSING

New and Improved Design

Made in 4 Sizes up to 100 H. P.

Shafts up to 2½" Diameter.

Angle of Drive Up to 15°.

Send for our catalogue and Prices.

WORLD RENOWNED (Patented)
EVANS MODEL
"HELE-SHAW CLUTCH"





Unequalled for smoothness, durability and control.
Send us your requirements.

M. & E. GREASE CUPS
(Patented)

Admittedly the shortest, best, cleanest and most satisfactory grease cup on the market. Send for a sample and price. We can make prompt delivery.

TRADE MARK M & E REG IN U.S.PAT.OFF

1866— MERCHANT & EVANS CO. —1916
PHILADELPHIA

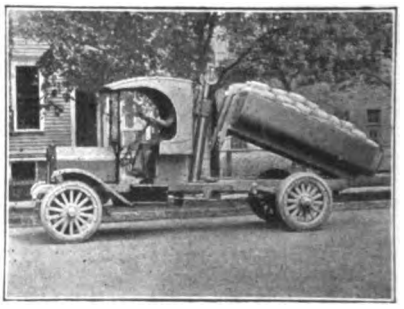
NEW YORK CLEVELAND CHICAGO
BALTIMORE WHEELING ST. LOUIS
ATLANTA KANSAS CITY

Stegeman

SIX-CYLINDER
SELF-STARTER

WORM-DRIVE

TRUCKS



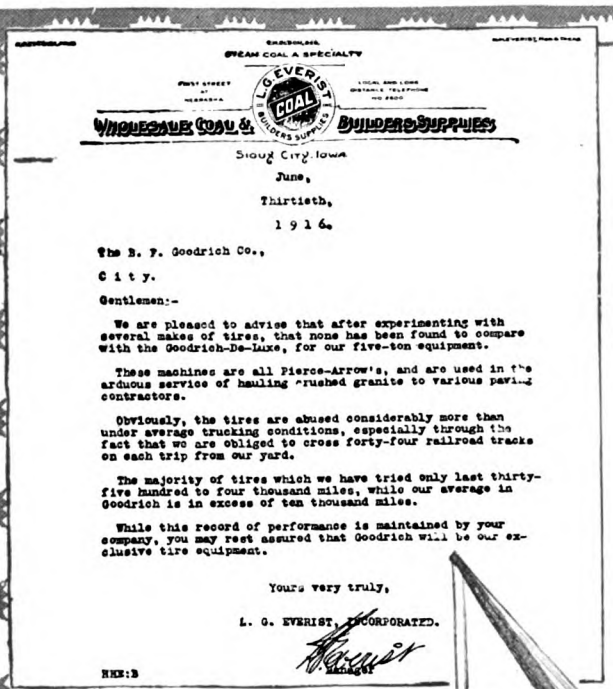
The most for your money—that's what we offer. A 6-cylinder Motor, Electric-Starter and Electric-Lights are furnished on our truck without extra charge. On any other machine they would cost $300 extra.

Ours is not the cheapest truck on the market, but it is certainly a low-priced line, quality considered.

WE WANT RELIABLE AGENTS

STEGEMAN MOTOR CAR CO.
Milwaukee, Wisconsin

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STEAM COAL A SPECIALTY

L. G. EVERIST COAL BUILDERS SUPPLIES

WHOLESALE COAL & BUILDERS SUPPLIES

Sioux City, Iowa

June,

Thirtieth,

1916

The B. F. Goodrich Co.,

City.

Gentlemen:-

We are pleased to advise that after experimenting with several makes of tires, that none has been found to compare with the Goodrich-De-Luxe, for our five-ton equipment.

These machines are all Pierce-Arrow's, and are used in the arduous service of hauling crushed granite to various paving contractors.

Obviously, the tires are abused considerably more than under average trucking conditions, especially through the fact that we are obliged to cross forty-four railroad tracks on each trip from our yard.

The majority of tires which we have tried only last thirty-five hundred to four thousand miles, while our average in Goodrich is in excess of ten thousand miles.

While this record of performance is maintained by your company, you may rest assured that Goodrich will be our exclusive tire equipment.

Yours very truly,

L. G. EVERIST, INCORPORATED.

President

HHK:B

Through with 3500-mile tires since getting excess of 10,000 miles from

GOODRICH DE LUXE TRUCK TIRES

(Made in 5-inch, 6-inch and 7-inch widths)

—Experience of L. G. Everist and hundreds of other large contractors has led them to specify **Goodrich De Luxe** tires as exclusive equipment. This they have done after experimenting with other makes.

—*You* don't need to experiment. Place your faith in the exceptional performance ability of **Goodrich De Luxe**—the tires of extra-volume tread rubber. They wear longer and so cut down truck operating costs.

Write for catalog

The B. F. Goodrich Co.

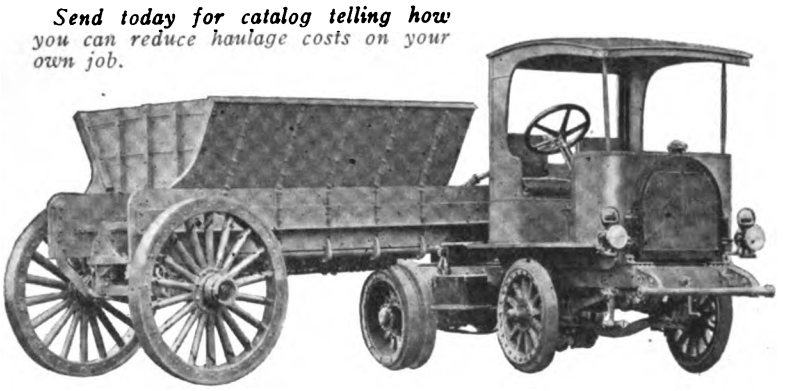
Akron, Ohio

Makers of the Celebrated Goodrich Automobile Tires—*"Best in the Long Run"*

Service Stations and Branches in All Principal Trucking Centers

THE 100% WATSON

Send today for catalog telling how you can reduce haulage costs on your own job.



Note this short turn and think how convenient it would be in maneuvering in narrow places, around short corners, and in pulling out of bad spots. It's something you will find only in the "100% WATSON" Tractor and Five Ton Trailer.

Five Ton Tractor and Trailer

can be turned without backing in a 31-foot circle, or by backing only once, in a 20-foot circle. And it can be backed just as readily as a four-wheeled truck.

Think what this means in the contracting game. You

Can Go Anywhere

with a "100% WATSON" that you can go with any other heavy haulage equipment. In fact, you will find that you can **get in and get out** of many places with a "100% WATSON" quicker than with any other motor vehicle.

The bottom-dumping feature of the Trailer is just like the famous Watson Dump Wagon and facilitates quick handling of material.

WATSON WAGON CO.

ASK FOR CATALOG

The World's Largest Builders of Dumping Wagons

28 W. Center Street, Canastota, N. Y.

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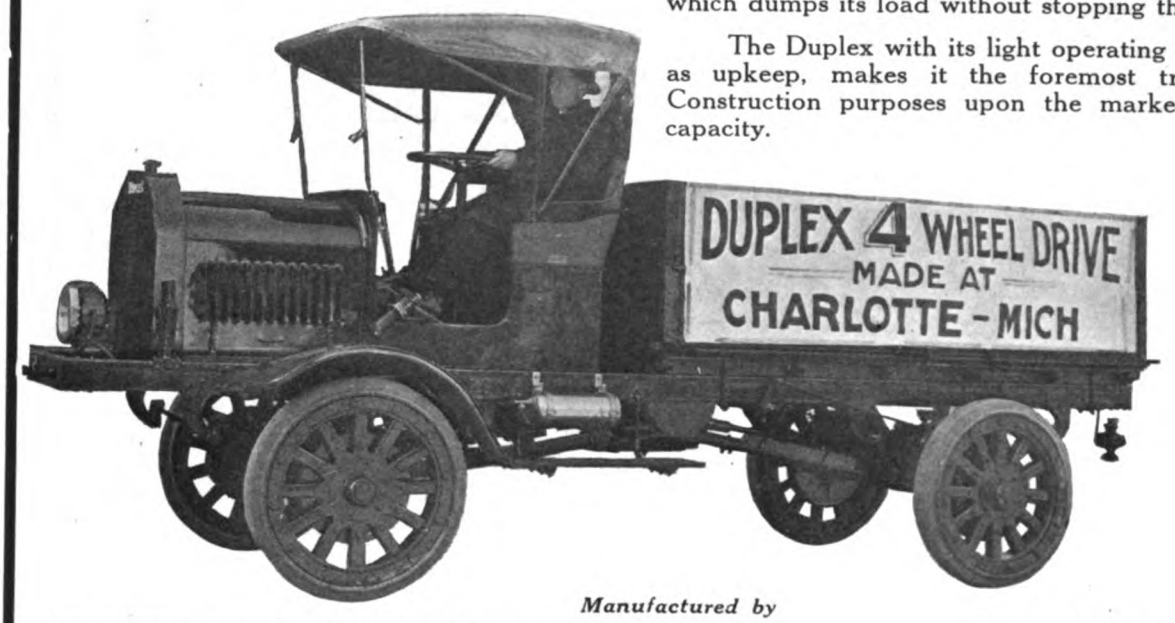
DUPLEX 4 WHEEL DRIVE

THE TRUCK OF EARNING EFFICIENCY

This cut represents the Duplex 4-Wheel Drive Road Truck, and is one of many others hauling one hundred and fourteen yards of gravel every twenty-four hours, a distance of 7.7 miles and at $1.00 per yard, earns $114.00 per day.

This truck with trailer has Duplex Side Dump Body which dumps its load without stopping the truck.

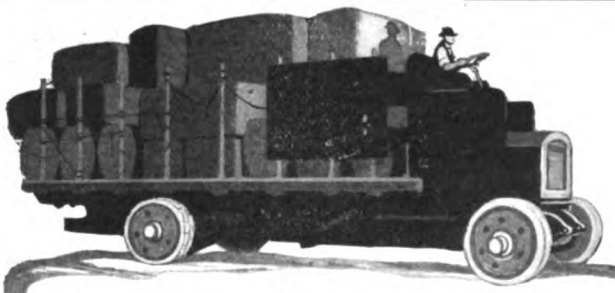
The Duplex with its light operating expense as well as upkeep, makes it the foremost truck for Road Construction purposes upon the market regardless of capacity.



Made in two-and three-ton capacity

Manufactured by

DUPLEX POWER CAR CO., Charlotte, Mich.



In the Steady Grind of Heavy Work—

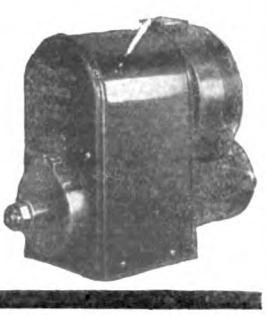
you need power—steady, reliable, unfailing power.

The

EISEMANN MAGNETO

is known throughout the land for Hot, Sure Spark at all speeds (even the lowest); Easy Starting; Simple, Sturdy Construction.

Proof: 108 Manufacturers of Trucks, Tractors, Pleasure cars, etc., use nothing but Eisemann. Pretty good evidence!



THE EISEMANN MAGNETO CO.
Sales and General Offices
32d-33d Sts., Brooklyn, N. Y.
Indianapolis, Ind. 415-417 N. Capitol Ave. Detroit, Mich. 802 Woodward Ave.

PERFECT simplicity of operation is ONE reason for WOOD hoist supremacy. There are, very naturally, others.



NINETY per cent. of the truck makers in this country list WOOD bodies as standard equipment — now *why?*

Talk it over with your dealer today

WOOD HYDRAULIC HOIST AND BODY CO.
DETROIT

WOOD HOISTS WOOD BODIES

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AN ESTABLISHED SUCCESS



Kelley Convertible Rear System

and a Ford. One-Ton Capacity. Sells Everywhere—Good Reasons. ***In terms of service no other one-ton truck of any build is worth more.*** Shaft drive only.

$365 Internal Gear **Worm Gear $385**

Dealers may secure choice territory. Prompt deliveries. Favorable terms. Best opportunity.

KELLEY CONVERTIBLE AUTO TRUCK CO.

Factory: Joliet, Ill. **332 SOUTH MICHIGAN AVE., CHICAGO, ILL.**

One Thousand Miles on High Gear

OVERLOADED 20 PER CENT.

Every hill on this route through Ohio and Michigan was taken on high without straining. Read the story in our booklet "The Wizard of Trucking." Only a Six and only a "Globe" could do it on 12½ miles per gallon of gas.



Six Cylinder Motor

trucks handle like a pleasure car. Start easier. On high 1½ miles to 25 miles per hour. 11 to 15 miles per gallon of gas. Quieter operation. Minimum motor vibration. Go anywhere, any roads, any time. Agencies being established rapidly. Write today.

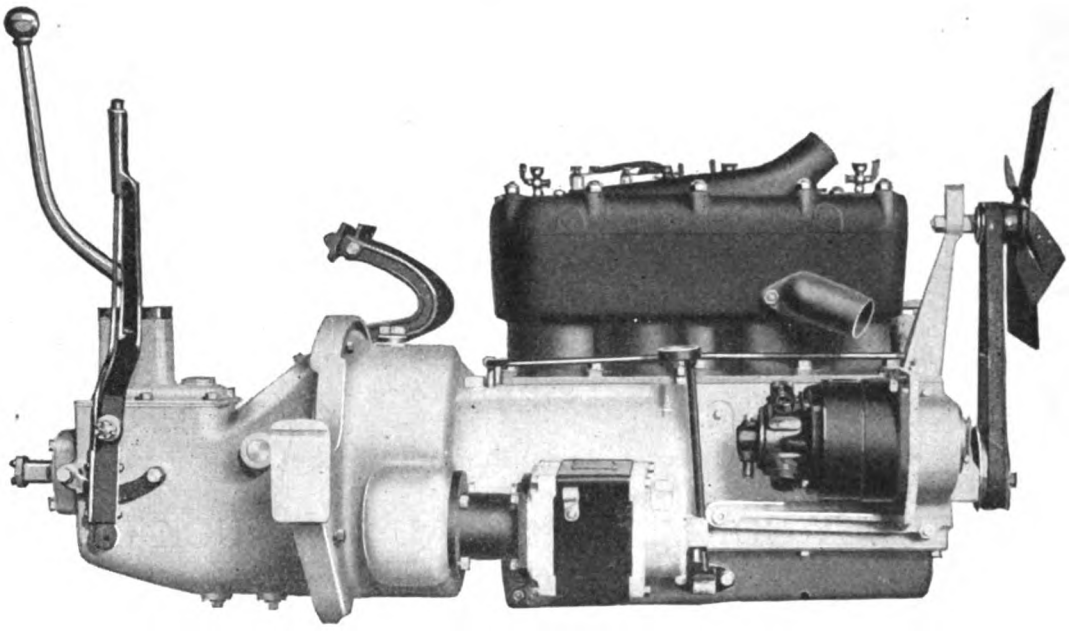
MFG. BY

THE GLOBE MOTOR TRUCK CO.

NORTHVILLE, MICH.

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Long Life



22½ H.P., Four Cylinders, 3¾"x4¼"—develops 36.9 at 2800 r.p.m.

G B & S motor

Four factors that assure long life are conspicuous features of the G. B. & S. motor.

These are: the substantial construction from highest quality materials, the extra heavy crankshaft, supported on three unusually large bearings; the simple, direct, splash oiling system and the inherent smooth running qualities of the motor secured by the special method of timing.

The records of the G. B. & S. motor in service leave no uncertainty as to the value of these four G. B. & S. features—especially are they of prime importance to makers of motor trucks.

New Chain Adjustment

This feature, exclusive with the G. B. & S. motor, makes it possible to tighten chains on both magneto and generator in a few seconds. One of the simplest and most direct adjustments known. Write for details.

The fact that we build just one type of motor—have nothing else to sell—has many important advantages that will be perfectly clear to every motor truck builder. If you are interested, write

Golden, Belknap & Swartz Co.

Detroit, Mich.

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"Sure, I can make that grade!"



GMC Trucks Gain the Drivers' Good Will

Prospective truck buyers realize that the truck driver, who fairly lives with his truck and sees it under all conditions, is in a position to talk knowingly about its performance or shortcomings.

More and more each day drivers are being given a hearing when new trucks are to be bought, and questioned more each day by those about to purchase trucks for the first time.

To GMC dealers this has a world of meaning—for invariably GMC drivers are GMC boosters. They talk, enthuse about, and praise the truck which has deservedly won their good will; and the driver's influence is a factor in truck sales.

GMC dealers know the satisfaction that comes in selling trucks that satisfy both owner and driver.

If you are thinking of taking on a line of trucks, and your territory is now open, write TRUCK HEADQUARTERS and get our dealers' proposition.

GMC trucks offer a sane, satisfactory business opportunity.

GENERAL MOTORS TRUCK COMPANY

One of the Units of General Motors Company

PONTIAC, MICHIGAN

Direct Factory Branches:

New York *Boston* *Chicago* *Philadelphia* *St. Louis*

108

A COMPLETE LINE
from 1500 lbs. to 5 tons
Worm and Chain Drive

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Another

FEDERAL

One hundred and fifty Federal dealers at the fifth annual Federal Convention early in September established a new record in motor truck circles when, in less than fifteen minutes, they gave definite orders for

One Million Dollars Worth

of one new 1917 model Federal, exhibited for the first time at this convention. No greater tribute was ever given any motor truck company than this.

These Federal dealers knew the new model would be all or more than was promised them—and they did not hesitate to invest in its future.

They knew the past records of Federals—their records of performance, their great percentage of repeat orders.

And just as 1916 has been the greatest year in the history of the Federal Company, so is 1917 going to be even greater.

The great increase in Federal production, and the 1917 additions to the Federal line make it the best dealer's proposition in the Motor Truck World today.

The Federal Motor Truck Co.

DETROIT, MICHIGAN



Their ninth
FEDERAL

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Don't Take Chances WITH YOUR BRAKE LINING BUSINESS

There is good money for you in Brake Lining Renewals. And if you choose GARCO Asbestos Brake Lining for every job there is a big opportunity for you to build permanent, profitable business not only on renewals, but on other automobile accessories as well. Your customers depend on your judgment, and GARCO Asbestos Brake Lining will back your good workmanship to the limit.

GARCO will not heat or burn. It is solidly woven from high grade asbestos, and may be drilled instead of punched for the insertion of rivets.



GARCO is not affected by water, oil, grease or dirt. It costs your customer less per mile of use; and every renewal job brings you a **good, substantial** profit.

We also manufacture a special type lining for Ford Transmission Bands, put up in rolls and complete sets with rivets. The GARCO Line includes a complete line of Asbestos Automobile Specialties.

Your Jobber can supply you with GARCO Asbestos Brake Lining. We will gladly give you full information—tell you about our interesting dealer's proposition if you will write us direct.

GENERAL ASBESTOS & RUBBER CO.

Main Offices and Factories: CHARLESTON, S. C.

A Complete Stock Is Carried At Our Branches:—

58 Warren Street, New York **312 First Avenue, Pittsburgh**

530 Goldengate Avenue, San Francisco

GARCO

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A "G-B" Dealer Dominates the Field

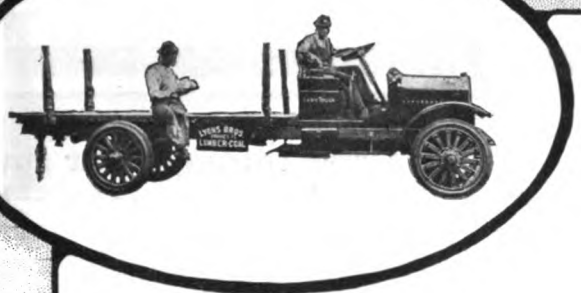
DEALERS who handle Gramm-Bernstein Trucks meet and overcome competition—are the biggest men in every locality. They sell "G-B" Trucks from 1 ton to 6 tons—including famous patented elevating coal truck with partitioned body—three compartments for three different kinds of coal, as well as body types for all lines.

No prospect gets away—they sell the best truck, for the greatest variety of uses, at the right prices. Ask for our new sales policy including reasons why it pays big to handle the "G-B" line. Free advertising in your local papers, our dealer sales service, etc.

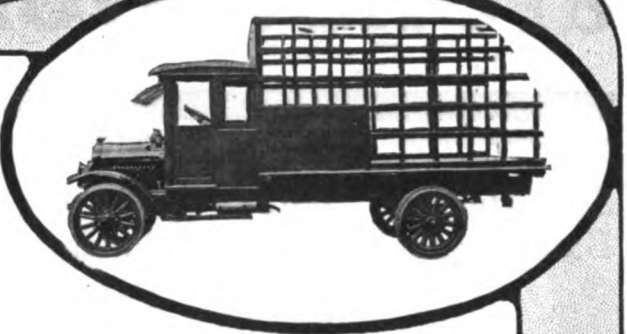
The Gramm-Bernstein Company, 13 Gramm Boulevard, Lima, Ohio, U.S.A.

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GARY



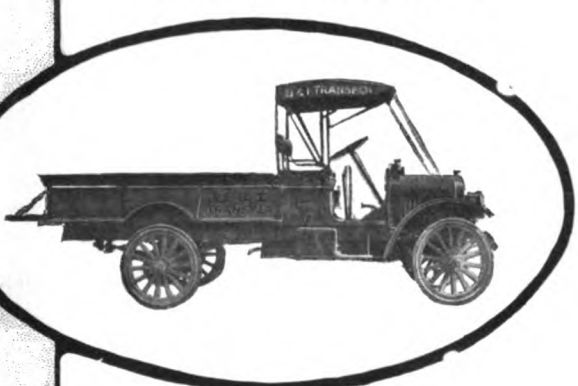
GARY Trucks Doing Daily Service In Joliet



Gary Worm Drive Trucks

Once Introduced Are Established in Any City

"BUILT IN THE FACTORIES OF EXPERTS"



Six months ago a GARY Truck had never been operated within the city limits of Joliet, Ill.

Today representative Joliet concerns are rapidly building up GARY fleets.

The Joliet Citizens' Brewing Co. has bought no other make of truck since the delivery of its first GARY.

Yates Bros.' Transfer & Express formerly used only old-line trucks of long standing national reputation. Today they boast of equally satisfactory service from their GARY, at half the cost.

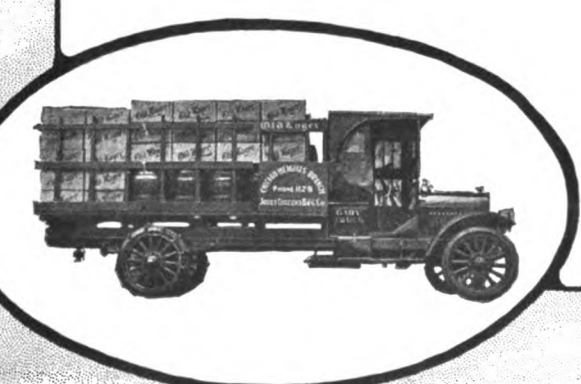
You are familiar with the manufacture of every part that goes to make up GARY Trucks. Buda, Eisemann, Stromberg, Raybestos, Goodyear, Sheldon, Fuller, Hayes, Blood Bros. speak for themselves. They are all a part of every GARY model.

Write or wire today for complete details and prices. DOMESTIC BUSINESS ONLY.

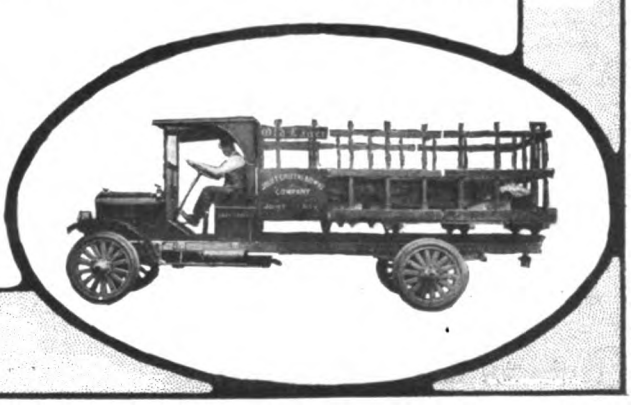
4 Models
4 Capacities
4 Prices

THE GARY MOTOR TRUCK CO

610 BROADWAY **GARY, INDIANA**



Two of The GARY Trucks From Joliet Citizens' Brewing Co. Fleet

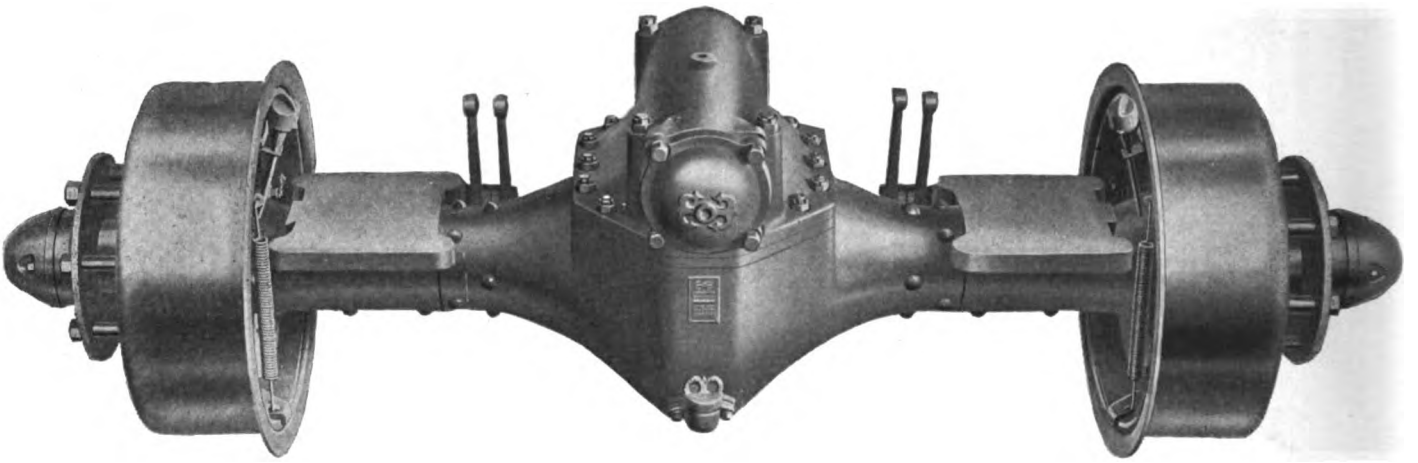


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44¾% of all Truck Models are now Worm Gear Driven

Semi-floating construction
Ball Bearings for wormloads

Drive through rear springs
Brakes on rear wheels



SHELDON

There are five types of final drive used in motor truck practice to-day.

In 1913 only 1% of the truck models produced in this country were worm gear driven.

In 1914 this percentage increased to 11½%.

In 1915 it further increased to 21½%.

In 1916, 44¾% of all truck models carried will use worm gear as the final type of drive—the other four types of final drive divide up the remainder.

It is also interesting to note that taking the driving strains through the rear springs has been adopted by a preponderant majority of truck makers for 1916.

This is another Sheldon victory—for Sheldon is a pioneer in this method of handling driving strains—which means lighter trucks and simpler trucks.

THE SHELDON AXLE AND SPRING COMPANY

Wilkes-Barre - - - - - - - - - - - - - Penna.

Makers of Springs and Axles for Heavy Duty Service for more than 50 years

CHICAGO: 122 S. MICHIGAN BLVD. SAN FRANCISCO: 444 MARKET ST. DETROIT: 1215 WOODWARD AVE.

PLEASE MENTION THE COMMERCIAL VEHICLE WHEN WRITING TO ADVERTISERS

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A Better Truck is not for Sale!

WHEN the enthusiastic representative of a motor truck manufacturer tells you that his line is better than the Bessemer, well, he's mistaken!

A better truck is not for sale. Money can't buy higher quality than is built into

THE BESSEMER LINE

With component parts made by the acknowledged leaders of the truck industry, our experienced designers have conceived and caused to be built a rugged, dependable truck, simple in construction, powerful, economical in first cost and operating expense and efficient in service even when driven by unskilled or careless drivers.

For Contractors and Merchants

these trucks offer the means of lowest cost transportation. They are light without having strength sacrificed, strong without being clumsy, simple without economizing on essentials.
At their respective prices our various models offer the fullest values for like capacities. We are more than ready to enter at any time, in any place, for any service, a series of competitive tests and to accept the verdict of the unbiased prospective purchaser.

One-Ton	Two-Ton	Three-and-One-Half-Ton
Internal Gear Shaft Drive	Worm Drive	Worm Drive
$995	$2200	$3100

DEALERS—Write us NOW for our liberal selling plans. We give interested factory co-operation and enterprising aid to our dealers.

All inquiries regarding territory in New England, Eastern New York, Eastern Pennsylvania, New Jersey, Delaware, Maryland, Virginia and District of Columbia should be addressed to our Eastern distributors:

Bessemer Motor Truck Corporation

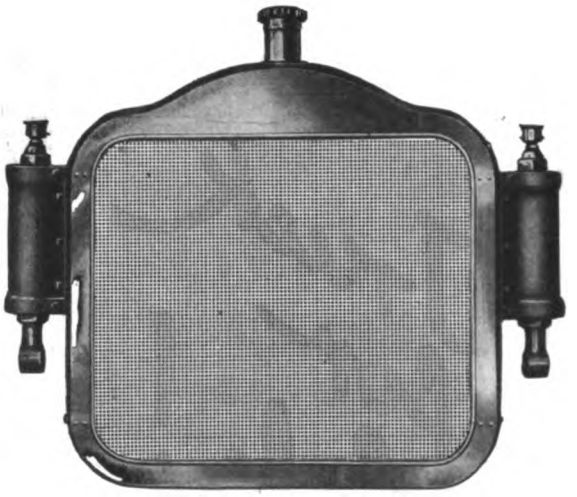
Lexington Avenue and E. 42nd Street NEW YORK CITY

All other inquiries to

BESSEMER MOTOR TRUCK COMPANY : GROVE CITY, PA.

BESSEMER

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FEDDERS QUALITY

—is best exemplified in Trucks.

The Truck Owner wants but one thing—lowest ton mileage cost. But that one thing he **needs**—and invariably demands.

The Truck Manufacturer knows this need and he builds to fill it. He equips his product with parts selected solely for their ability to render long, unremitting Service—Service that is unvarying and absolutely dependable.

Fedders Radiators

—are standard equipment on most of the leading makes of American Trucks—those that lead in quality as well as quantity of production. They have been standard equipment on some of these makes since Fedders Radiators were first brought out—19 years ago.

There is—there can be—only one reason for this—and that reason lies in the ability of Fedders Radiators to deliver

Unequalled Service

FEDDERS MFG. CO.
BUFFALO N. Y.

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ROSS GEARS

117 Truck Manufacturers use ROSS STEERING GEARS.
117 Able and experienced Truck Engineers endorse them.

WHY?

BECAUSE their design is perfect.
BECAUSE their workmanship is of the finest.
BECAUSE they contain the finest material available.
BECAUSE they stand the punishment.
BECAUSE they do not break.
BECAUSE they are durable.
BECAUSE they steer easily and safely.
BECAUSE they are essentially TRUCK STEERING GEARS.
BECAUSE they are well and favorably known in the Truck Industry and are a help to Truck Sales.

IN FACT

BECAUSE THEY DO THEIR WORK SUCCESSFULLY

Write for our descriptive catalog and give us an opportunity to quote you.

ROSS GEAR AND TOOL CO.

790 HEATH STREET **LAFAYETTE, IND., U. S. A.**

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Truck

Are You Figuring In the Dark?

Time sales are about the most important factor in your business—aren't they? If you figure in the dark on this subject you can't hope to meet and beat competition that's awake—and figuring in the light. Answer these five questions yourself in the light of your own experience.

1 Does your present method of financing time sales leave you your full profit—or do you share it with some one else by paying brokerage or other discount charges?

On a "deadly parallel" comparison the Guaranty Truck Plan proves up as the only standard plan which doesn't whittle down the dealers profit under one disguise or another. Full profit—every cent of it—on every sale—every time. Let this sink home.

2 Another big question—Does your present method of finance bring you new sales? The new field is immense. Are you left to develop it alone—without help? Just told to jump in and swim—or sink?

The Guaranty Truck Plan is backed and operated by the banking organization that knows more than any other in America about Time Sales. Its experience overtops all others. The Guaranty Plan is the only nationally advertised plan. Many thousands of dollars are being spent by us for advertising that reaches practically every truck buyer and prospective buyer in America. Thousands of interested prospects in response to this advertising ask us for the facts about the Guaranty Plan. These inquiries will be referred to you as fast as they reach us provided you will sell under the Guaranty Plan. These "leads" are yours if you register now.

Thirteen thousand pleasure car dealers have already registered as Guaranty Plan dealers. Sixty-four percent (64%) of all Guaranty purchasers on the pleasure car plan went to the dealers and bought. The dealers didn't come to them and sell. We bring the prospect and dealer together—to their mutual profit.

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Dealers

Dealers report phenomenal increases in sales because of the Guaranty Plan. Conversation is cheap—but in a showdown of *facts* we can prove that the Guaranty Plan stands head and shoulders above any other as an actual producer of sales. New fields—full profits—and real help in developing them—that's the Guaranty platform—and the Guaranty practice. Now answer question three.

3 Is your present method really convenient? Isn't it cluttered up with a good deal of unnecessary red tape? Don't you ask your customers to sign quite a bunch of Papers—notes and goodness knows what not? Do you like this—or would you appreciate Guaranty Plan simplicity? We know truck purchasers will.

Simple forms—simple requirements—simple every day English—a straightforward business proposition that even a stranger won't shy at.

4 A short one—Is your present service prompt enough?

The Guaranty Plan checks go to dealers the same day notes are received. Read this dealer's letter—typical of hundreds—

—We have been doing business with you for over a year on the automobile time sales plan. We express our thanks herewith for your promptness in every transaction that we have made with you. We have increased our automobile sales better than 50% with your Plan the last six months, and as yet we have not had to take back a single car. You may use this letter as an advertisement. We will be glad to answer anyone regarding your Plan. WEHR & SAHR, Havre, Mont.

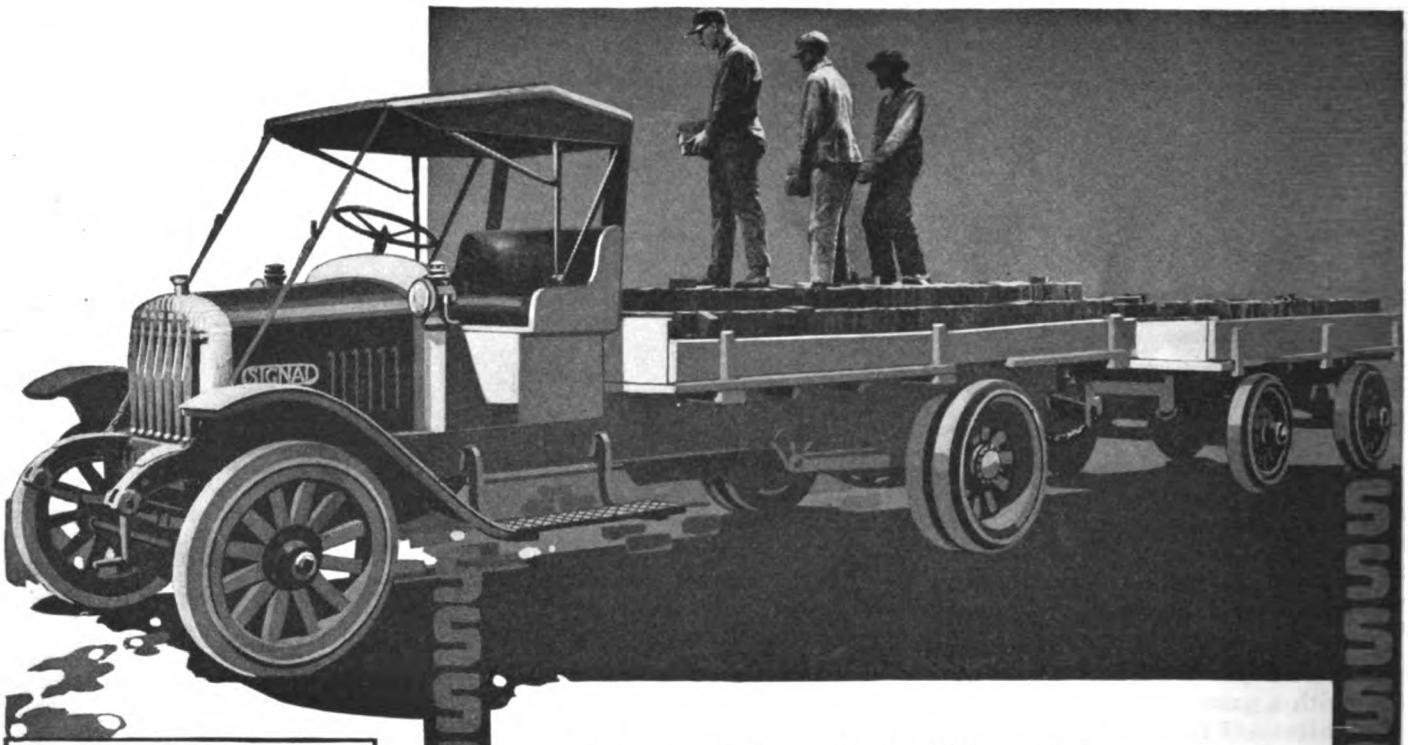
5 Don't you want to know the inside story—facts—figures—about the only standardized plan, available for any responsible dealer in any good truck anywhere in the country which gives Time for the Buyer, Cash for the Seller and Safety for all? Then write for the Guaranty Truck Book.

The complete list of advantages available to you in the Guaranty Truck Plan are described in our book, "Trucks on Time Payments," now ready for distribution. These advantages—all of them unusual, most of them exclusive—are too vital to the building of your truck and delivery car business for you to overlook. Copies of this book will be mailed to any established dealer and we shall be glad to answer specifically and in detail any questions as to how the Guaranty Plan can directly and most advantageously be applied. The Guaranty Plan means a bigger and better business for every dealer who employs it. Send in this coupon now—or write or wire.

GUARANTY SECURITIES CORPORATION
Member American Bankers Association
EQUITABLE BUILDING - - - NEW YORK CITY
SAN FRANCISCO, Hobart Building
MONTREAL, National Trust Bldg.

GUARANTY SECURITIES CORPORATION
Equitable Building, New York City
Send us the facts of the Guaranty Plan about Trucks on Time Payments.
We sell the _____ (here state make of truck you represent)
Name
Address

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"On the Job"—Always

Here's another illustration showing a Signal Motor Truck doing one of the things it is designed to do—another proof of that virility that keeps the Signal always on the job.

The fundamental virtue of Signal Motor trucks is that ability to be "on the job" and stay on the job.

That is precisely what you buy a truck for. All other truck virtues fade into insignificance compared to the ability to be always *on the job*.

This quality bespeaks all other desirable qualities, for no motor truck *can* persistently stay *on the job* unless it has all the inherent virtues of right design, substantial construction, efficient mechanism and a wide factor of safety for overloads.

Ask a Signal owner about his truck, and when he says it is "on the job" he gives it the highest praise.

It's the delays, the holdups, the failures to "deliver the goods" that make a truck costly.

It's the ability to carry the load and obediently and willingly *keep on* carrying the load, without a murmur that determines truck value, and makes Signal trucks the criterion of truck value.

Of course if the Signal trucks did not possess the cleanest chassis, the strongest construction, the healthiest and most reliable mechanism they simply could not stay on the job.

But they do stay "on the job"—and if that sort of a truck appeals to you as an owner or dealer, we will be pleased to submit full information about Signal Motor Trucks. Write.

SIGNAL
1-1½-2-3½-5 TON

Important Constructional Features

Continental Motors

Timken-David Brown, Worm-Drive Rear Axles

Ross Steering Gear

Brown-Lipe Transmission

Eisemann Magneto

Detroit Self-Lubricating Springs

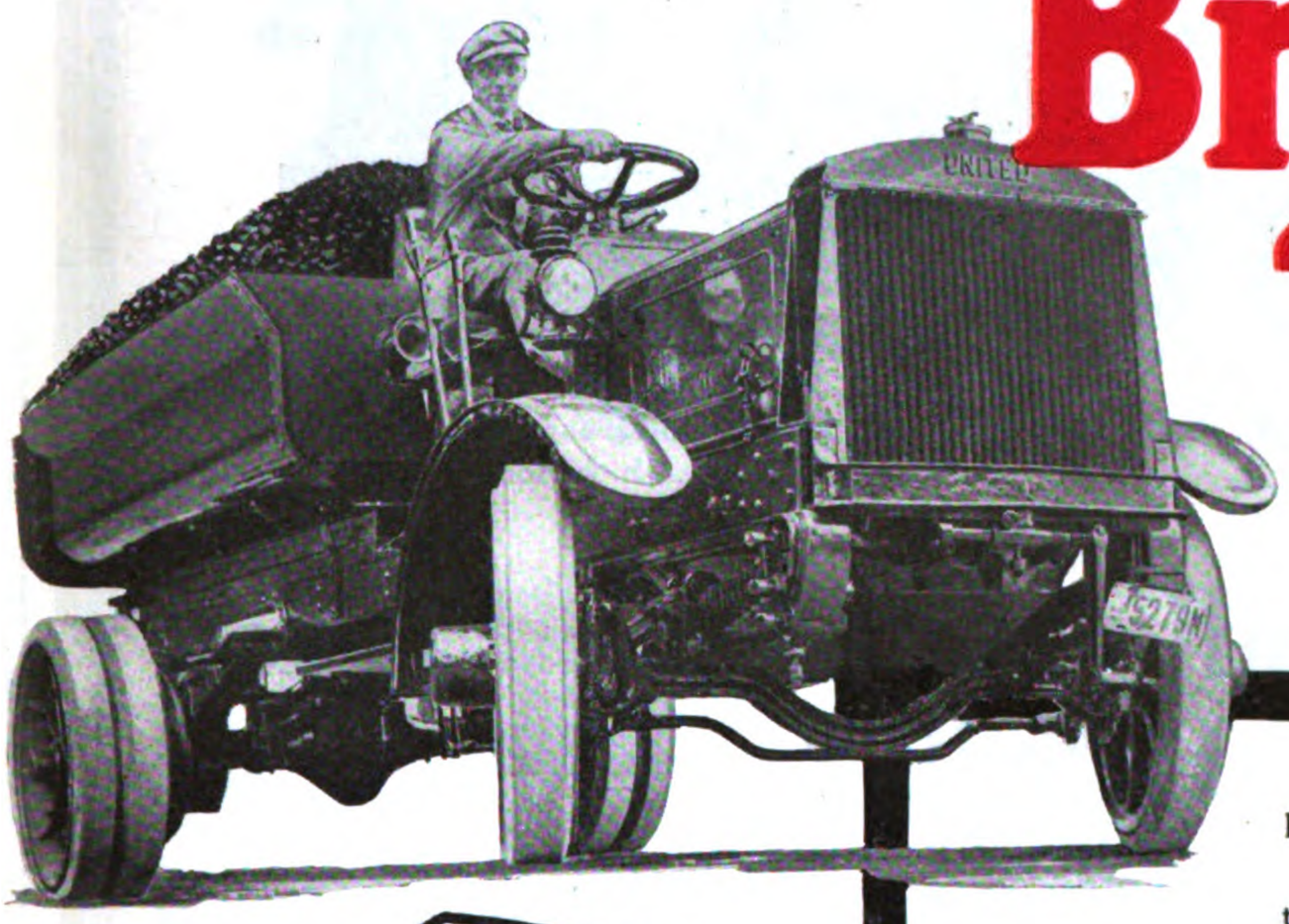
Stromberg Carburetor

Signal Motor Truck Co.

DETROIT, MICHIGAN

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Big Business Brands it "OK"



The dealer who handles United Trucks never has to make excuses.

He can put his finger on actual quality features that stand for long life and efficient service, because every detail of United Truck construction is a well-known standardized value and the characteristic features embodied in its design and construction are all such as are quickly recognized by the experienced buyers in the field.

In heavy duty service, such as municipal work, contracting work, the coal business, the ice business, the brick business, etc., United Trucks are daily setting new records of efficiency.

They have the strength to stand up in the most severe service—the power to transport the heaviest loads in quick time—the endurance and stability that guarantee years of satisfactory service.

United Trucks are made in 2, 3½, 4 and 5 ton sizes, all worm drive, furnished with stake bodies or special dumping bodies with hydraulic hoists.

In the motor truck field the heavy duty vehicles are making profit today both for the dealer and the user. If you are in a position to connect with a line that is sure to be a business builder for you, it will pay you to get in communication with us at once.

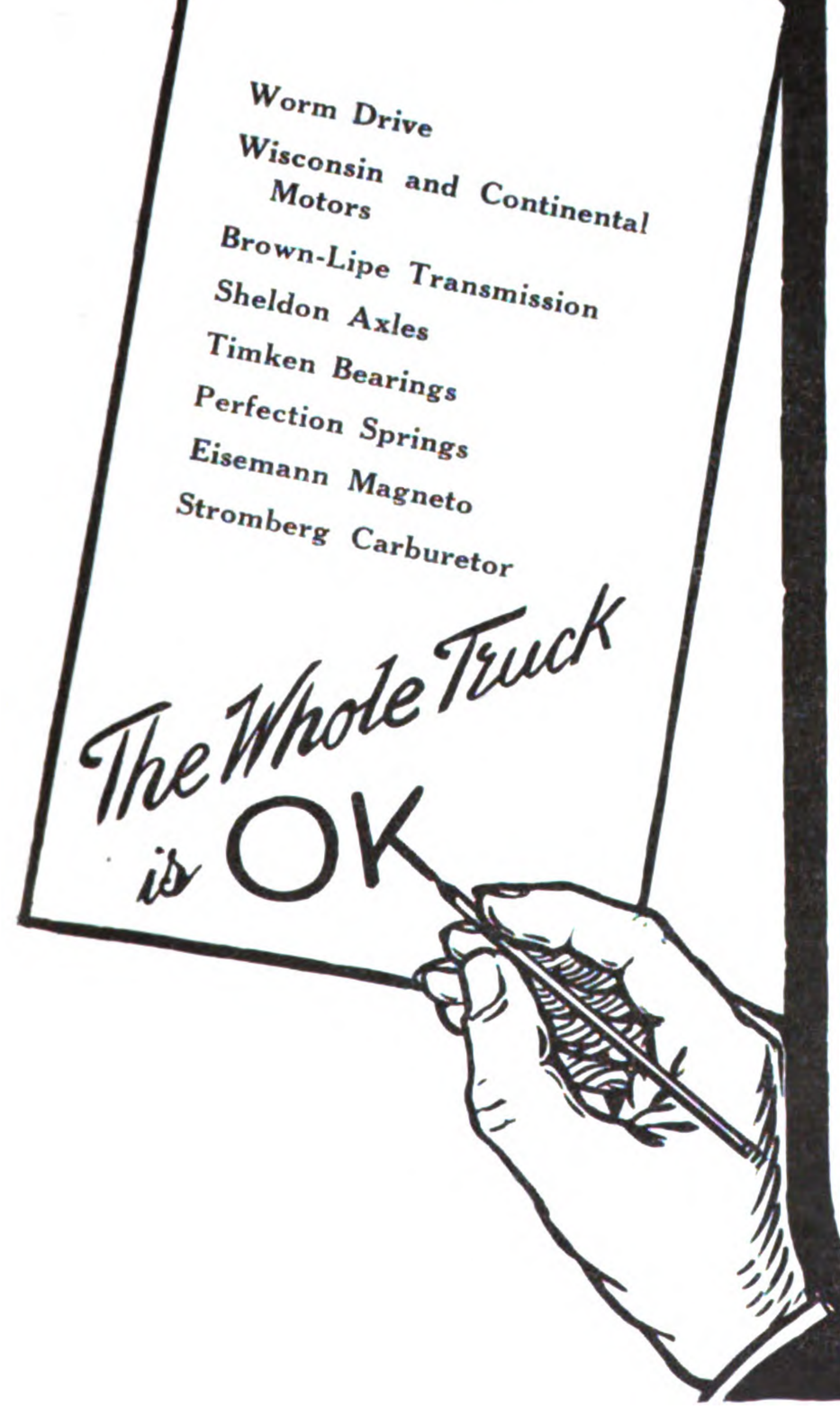
United Motors Company

672 North Street Grand Rapids, Michigan

United Trucks

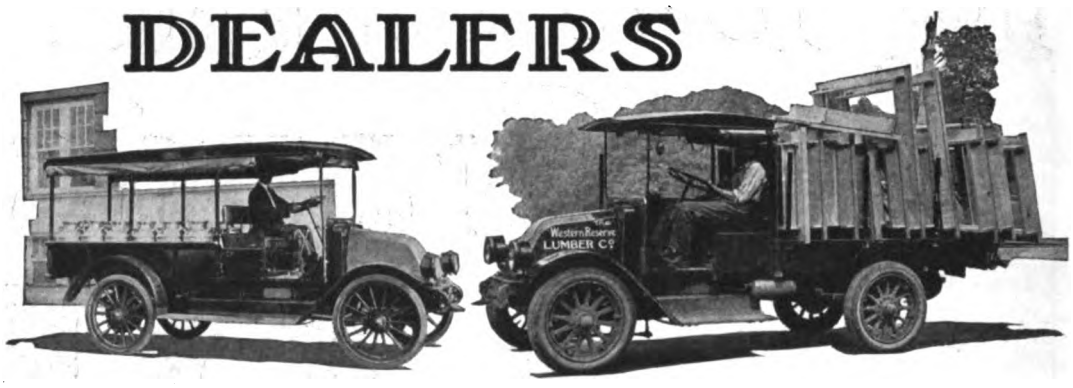
Worm Drive
Wisconsin and Continental Motors
Brown-Lipe Transmission
Sheldon Axles
Timken Bearings
Perfection Springs
Eisemann Magneto
Stromberg Carburetor

The Whole Truck is OK



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DEALERS



Model H, 1500 pounds capacity.
Chassis $1225, f. o. b. factory.

Model F, 2000 pounds capacity.
Chassis $1500, f. o. b. factory.

Can You Handle a Motor Truck That Sells?

This year we have sold the entire output of one of the largest motor truck factories in the country without taking a single war order. Next year the factory output is to be more than doubled.

We Offer to Distributors and Dealers an Opportunity to Share in the Profits of Marketing

International Motor Trucks

They sell. There is no question about that. In Michigan, in Ohio, in St. Louis and in Chicago—wherever we have been able to get authentic lists of motor truck registrations—International Motor Trucks lead all competitors.

We have just received a complete list of Wisconsin motor truck registrations. There again our trucks lead all others in numbers actually in use, and by a very comfortable margin.

This is a real opportunity. Better write or wire us at once for full information, as the best territories are going fast. Address

Motor Truck Department

International Harvester Company of America
(Incorporated)
88 Harvester Building **Chicago**

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A 1 TON TRUCK with the Ford Cost of Upkeep—

$325

F.O.B. Detroit

Everyone knows the exceedingly low operating cost of the Ford and everyone is going to know how the TONFORD truck unit attached to *any* Ford chassis, old or new, greatly reduces delivery costs—how it carries the same load more places, more quickly than any other one-ton truck and at much less operating cost.

The TONFORD truck unit is built of the best materials. Its specifications compare most favorably with the best one-ton trucks—and you do not have to pay the original price of an ordinary one-ton truck, nor its higher maintenance cost.

The TONFORD truck unit has a wheelbase of 127 inches—longer than most trucks of similar capacity. It has a loading space of 9 to 11 feet back of the drivers' seat and up to six feet wide, depending on the style of body. The heat treated rear axle, 2⅛ x 2⅛, is guaranteed for one and one-half tons. Its roller bearings will bear 7500 pounds weight. Its wheels are heavy artillery type.

Every detail of the construction of the TONFORD truck unit is made to stand the hardest kind of work, and the heavier construction throughout gives it a liberal factor of safety for the overload.

This unit is easily attached to any Ford, old or new, and should the car be desired again for pleasure, it may be as easily detached. Only four holes to drill.

If a one-ton truck will do—a TONFORD will do it better. Get a TONFORD. Immediate shipments—no long waits—big production. Write at once.

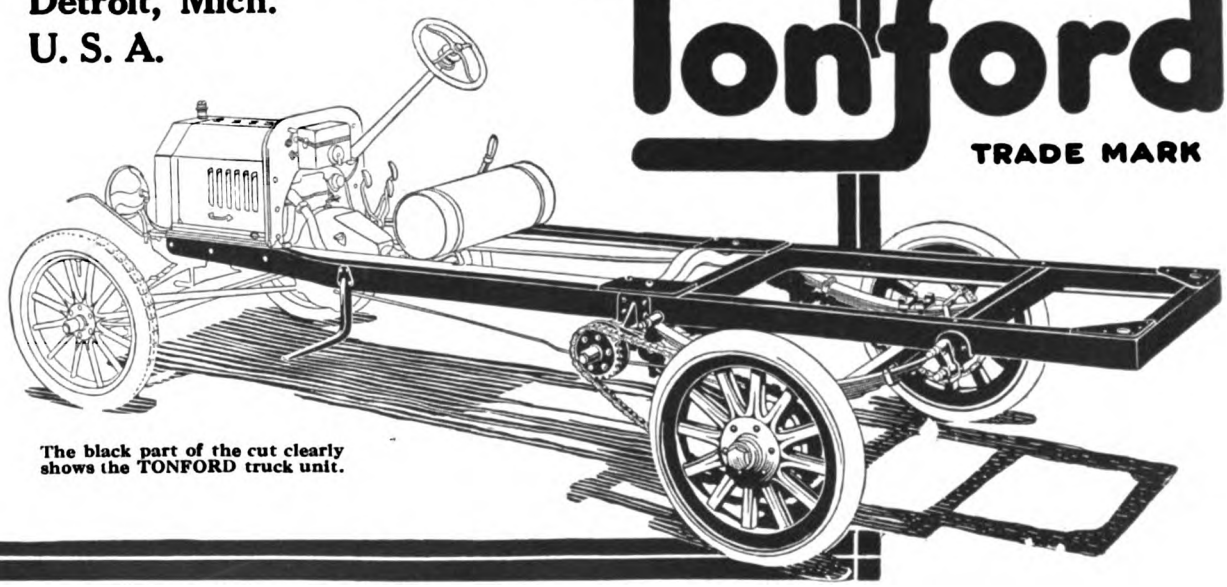
DEALERS

Here is the big, live opportunity of the year. Deliveries NOW. Sales opportunities everywhere. Some one will sell the TONFORD truck unit in your locality, why not you? Write now.

MADE IN DETROIT USA

Detroit Truck Co., Mfrs.
Detroit, Mich.
U. S. A.

Tonford
TRADE MARK



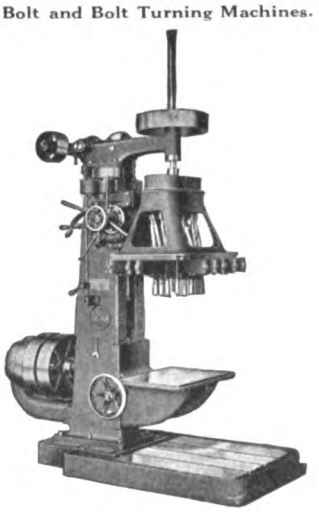
The black part of the cut clearly shows the TONFORD truck unit.

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Specialists in the manufacture of both straight face and hour glass type worm gear.

BAUSH
WORM DRIVE

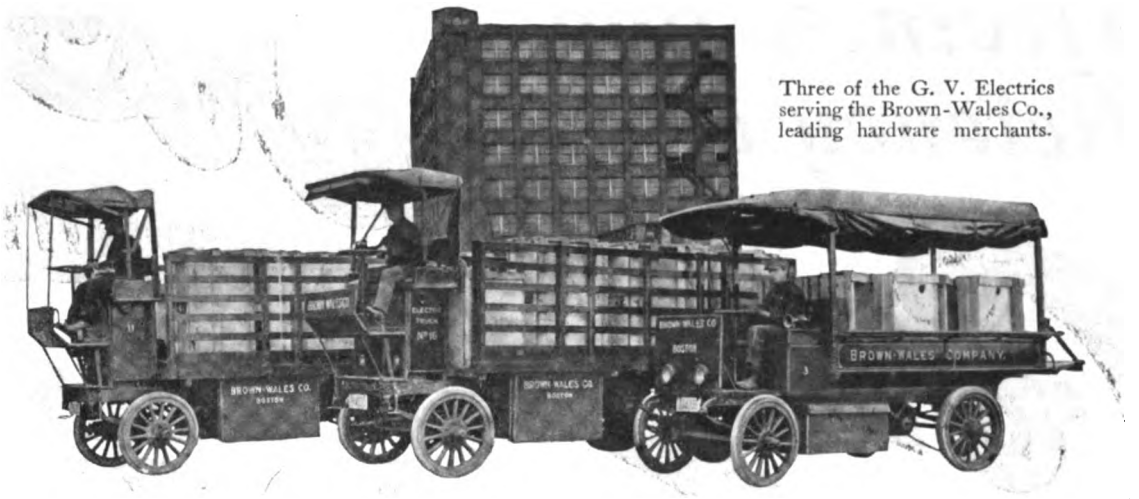
We are also manufacturers of Multiple Spindle Drills, Lassiter Stay Bolt and Bolt Turning Machines.



BAUSH
MACHINE
TOOL CO.
Springfield,
Mass.

Digitized by Google

The More You Know About Motor Trucks The Better You'll Like G. V. Electrics



Three of the G. V. Electrics serving the Brown-Wales Co., leading hardware merchants.

FOUR years ago we made the statement that "The more scientific motor trucking becomes, the more Electrics will be used." Check up the big fleets of the country today, and with the exception of those utilized by the oil companies, tire concerns, contractors, etc., you will find the Electric not only well represented but in many cases dominating in numbers.

The superiority of the Electric for city work is already appreciated by the more experienced users of motor vehicles. In numbers the Electric is just beginning to make itself felt, but in proving certain economic laws it has already made history. You can call "white" "black" for a while, but when it comes to a show-down somebody loses.

Experienced motor truck users have ceased to buy motor trucks on price alone. You can buy a pleasure car by-product for half what you pay for a good Electric, but it will last one-third as long and in most cases it will be out of commission so often that the necessary reserve equipment will eat up any possible saving. That's not exaggerating—just talk to the older users.

Honestly now, did you ever seriously set out to learn *why an Electric truck is different from a gasoline truck for city work?* Another question: How big a premium in operating costs are you willing to pay for your prejudice or indifference to efficient delivery in the city?

Would you be interested in knowing what G. V. users say about G. V. efficiency? Then write today for Bulletin 73.

GENERAL VEHICLE COMPANY, Inc.

General Office and Factory: Long Island City, N. Y.

NEW YORK CHICAGO BOSTON PHILADELPHIA

Six Models: 1,000 to 10,000 Pounds Capacity

Dealers in unoccupied territory are invited to correspond

16106

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Design and Construction

Striking Evidence of the Correctness and Efficiency of the Commerce

1500 POUNDS CAPACITY

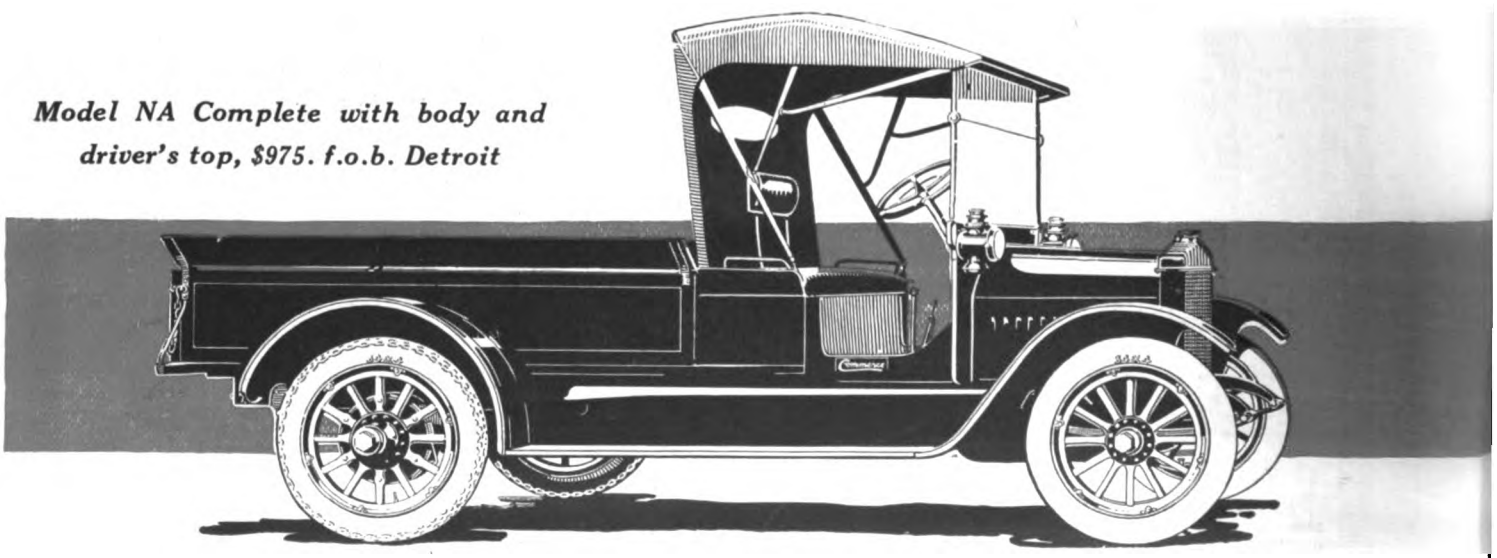
TRUCKS

$975 Complete

Choice of 3 Bodies

ONE of the best evidences of the correctness and efficiency of COMMERCE trucks is the fact that in the seven years they have been making good, there has been very little deviation from the original design, and in the last two or three years they have become absolutely standardized.

With thousands of these trucks doing daily duty throughout the country, we hear of practically nothing but words of praise from their users. We doubt if there is a truck company in the industry that can show a larger percentage of thoroughly satisfied users than we can, and every COMMERCE



Model NA Complete with body and driver's top, $975. f.o.b. Detroit

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Absolutely Unchanged

dealer is fortified by any number of enthusiastic COMMERCE owners who will go the limit for him in making sales.

We are doubling our capacity for next year, and consequently will double our selling force. With the big discounts and other attractive co-operative details provided in our dealer's contract—with a plan which provides for financing deferred payment sales, without the payment on the part of the dealer of any commission or brokerage fees, and which enables the dealer to carry a large stock of trucks if he so desires, we offer an exceptional proposition to about 250 more dealers throughout the country.

We can furnish conclusive evidence of the financial value of any COMMERCE agency beyond any question, and we will be interested in hearing from live dealers throughout the country who are looking for a real money making proposition.

In offering you the agency for COMMERCE trucks, we are presenting the most staple truck that you could possibly handle from the standpoint of size and capacity.

The demand for 1500-pound vehicles is enormous and constant, and if you will but put an honest effort into the proposition you can sell enough trucks to make the agency a very valuable asset—and in addition to that, you are offered a truck which, as evidenced by the satisfaction it gives thousands of owners, stays in good condition after you once deliver it to your customer. COMMERCE trucks are so exceptional and so staple that the truck dealer is not facing the bugaboo of profit consumption service and follow-up after it has been sold.

If you have any doubts about any statement we make, let us put you in touch with any one or more of our hundreds of dealers, and with any one or more of our thousands of customers, and let you get the story first hand from them. If you do this—and then you can qualify as a dealer—you will represent the COMMERCE Motor Car Company.

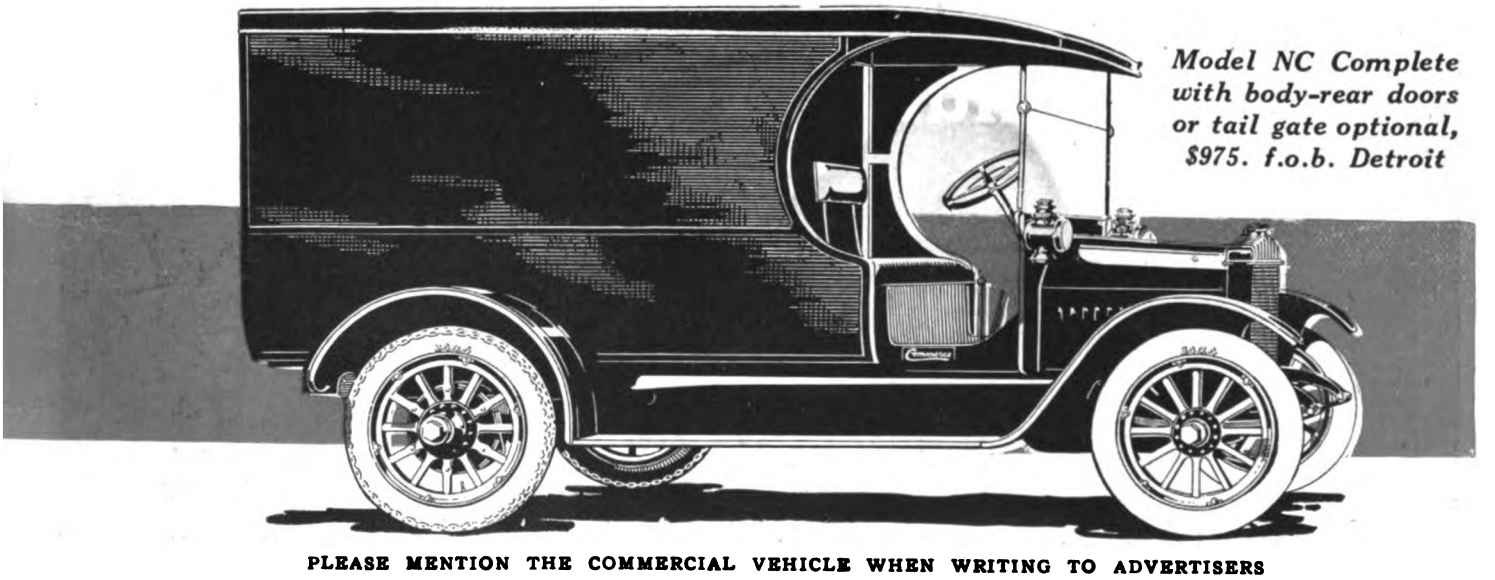
COMMERCE trucks are rated at 1500 pounds' capacity, and sell for $975.00, with a choice of three bodies:—Model NC—with body design for grocery, department stores, etc; Model NH—with standing top and water-proof curtains; Model NA—with open express type body.

All COMMERCE trucks are equipped with Continental motors, Eisemann magnetos, Cast tank radiator, three-quarter floating rear axle with nickle shafts and bearings.

Obviously, with a proposition so attractive as the one we have to offer, we are closing territory only with dealers who can handle the goods satisfactorily in every way. If you are such a dealer get in touch with us immediately. It will be money in your pocket.

Commerce Motor Car Company

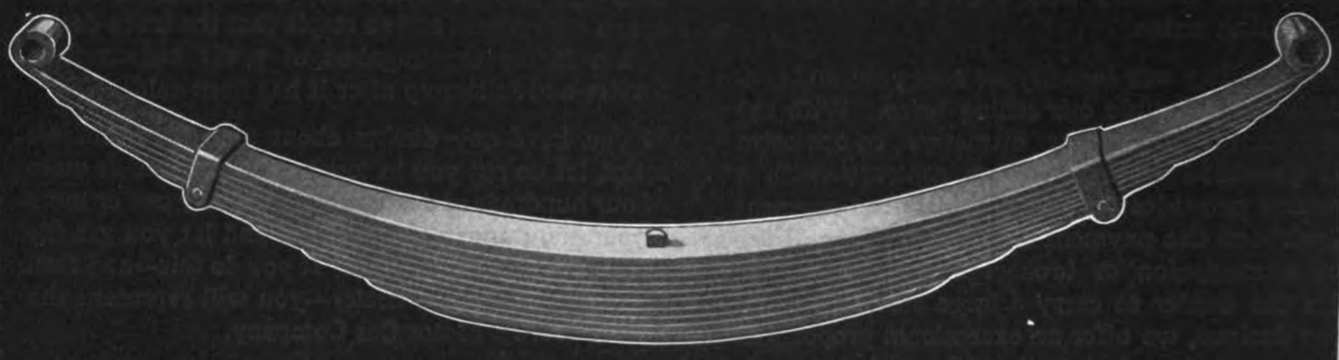
Detroit, Michigan



Model NC Complete with body-rear doors or tail gate optional, $975. f.o.b. Detroit

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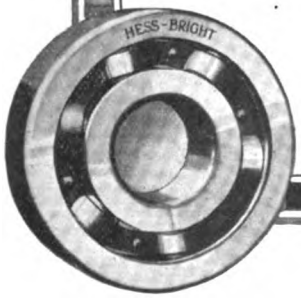


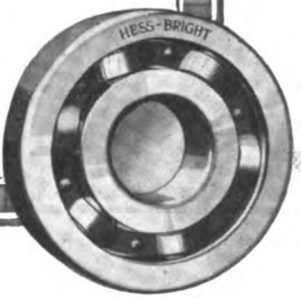
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THE INIMITABLE BEARING

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Let us be frank. HESS-BRIGHT BALL BEARINGS cost somewhat more than ordinary ball bearings, but is your choice of other equipment for your motor trucks governed by price? Especially when that equipment exercises a vital part in your machine service?

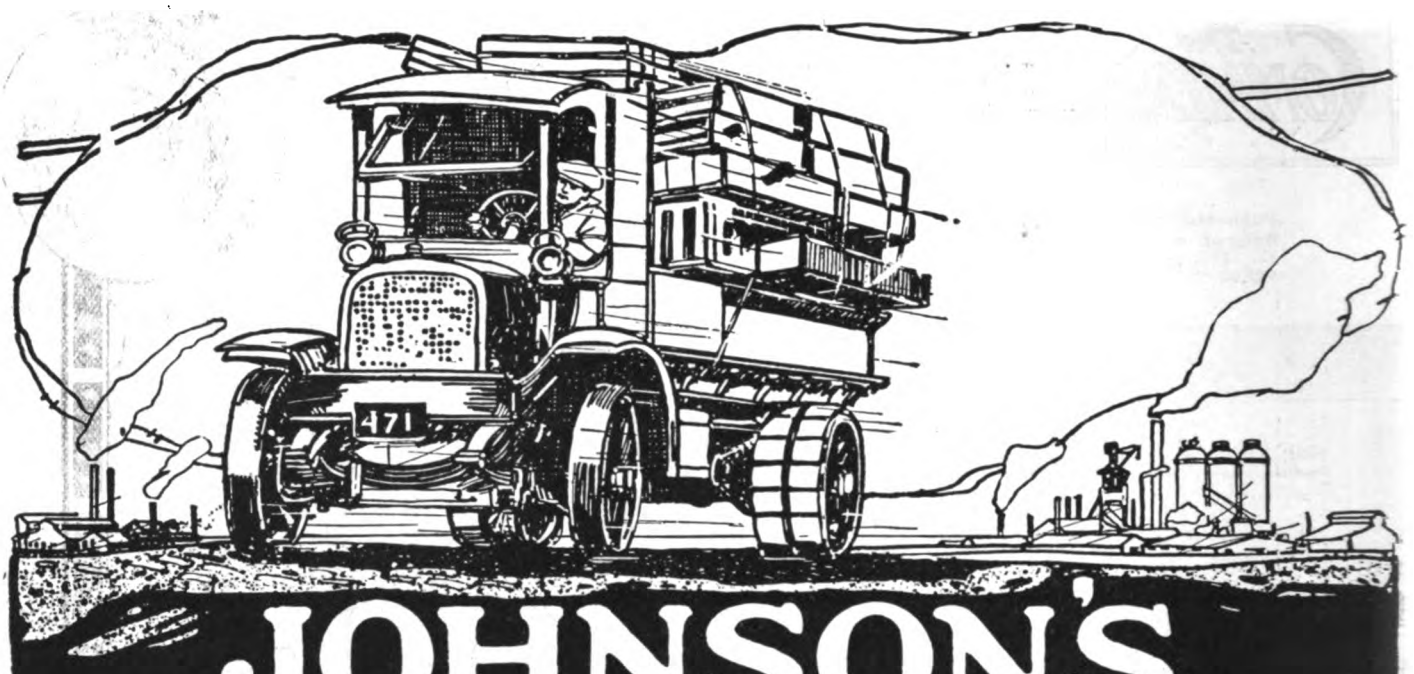
THE HESS-BRIGHT MANUFACTURING COMPANY
PHILADELPHIA, PA.





HESS-BRIGHT'S CONRAD PATENTS ARE THOROUGHLY ADJUDICATED

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JOHNSON'S CARBON REMOVER

You're Wasting Hundreds of Dollars' Worth of Costly Gasoline

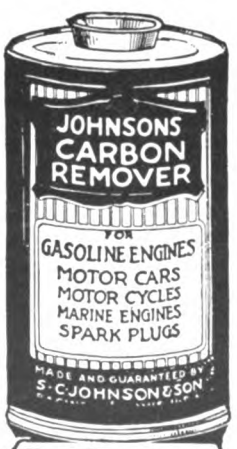
YOU are literally throwing away **one whole gallon of "gas" out of every four gallons that go into your tanks**—if your engines are "choked" with carbon deposits. What's more, you are paying out good delivery men's wages for time taken up in road delays—you're paying excessive repair bills—you're paying the price of prematurely worn out batteries, of crippled delivery service—of excessive wear and tear, of thousands of miles of lost truck service due to the untimely "petering out" of your motors. **Stop the big leak.** Plug up the drain on your cash register by annexing

JOHNSON'S CARBON REMOVER

Guaranteed Non-Injurious to the Finest Metal. = This peerless preparation saves you money on every turn. Saves gasoline—saves current—saves wear and tear—saves road delays,—saves repair bills—insures a quicker response — increases speed—increases power—increases the efficiency of your delivery service—adds thousands of miles to the life of your motor trucks.

Costs Just 35c to 50c a Cleaning

A pint can gives an engine 2 or 3 thorough cleanings—a cost of only **10% of the burning process.** And it's no trouble at all to apply—simply place it in the cylinders over night and the next morning "turn 'er over" a few times with the exhaust open.



Get Your Trial Can Now—If You Dealer Can't Supply You, We'll Send It Direct from Factory.=Just enclose a $1.00 bill or a dollar's worth of postage and we'll send you a can of Johnson's Carbon Remover by prepaid express. Obey that impulse. Sit down and **write now.** Later on, when you see your delivery system completely transformed—your old motor vehicles "purring" along like a cavalcade of brand new trucks—your goods all delivered "on the dot" and your delivery expenses reduced to a minimum—you'll be congratulating yourself over and over for your prompt action.

In Ordering Be Sure and Mention Your Dealer's Name.

S. C. Johnson & Son
Dept. CV - Racine, Wis.

Try this in Your Motor

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The COMMERCIAL VEHICLE
Read by Business Men

Published on the first and 15th of every month
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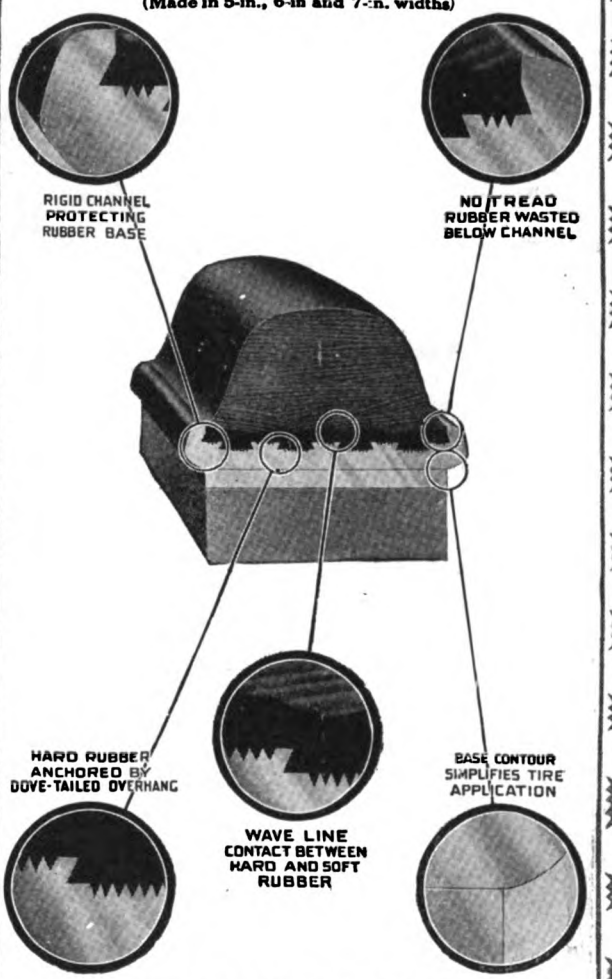
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The tire of extra volume, durable, resilient tread rubber. Experiences of truck operators in all parts of the country prove it the biggest *mileage giver* in all forms of exacting service.

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The B. F. Goodrich Company
AKRON, OHIO

Makers of the Celebrated Goodrich Automobile Tires—*"Best in the Long Run."*
Service Stations and Branches in All Important Trucking Centers.

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The Autocar



Armour & Company have used Autocars since 1911



Morris & Company have given eight repeat orders for Autocars in the past year

Used by The Big Chicago Packers

Chassis, $1650

More than 4000 concerns in all lines of business are using AUTOCARS



The Cudahy Packing Co. operate Autocars in twenty-one cities



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THE country's greatest concerns—keen buyers of equipment whose engineers accept none but the best—use Autocar Delivery Vehicles. Many of them have standardized on Autocars, operating large fleets.

For the big Chicago Packers—for the meat market owning one or two trucks, the Autocar has proved its great value and economy in all parts of the country and under all conditions.

Rugged in construction, it stands up year in and year out loaded to capacity. Low in operating cost, it pays even when lightly loaded.

The Bushwick Pork Packing Company of Brooklyn say:

"Our Autocar is a 100 per cent investment—has brought us new trade we could not have secured otherwise and has improved the trade we already had. For example, we used to deliver away up at the Harlem Market with horses. They got there between 10 and 11 o'clock, after the market was all over. Our Autocar delivers there by 6 o'clock and has built up our trade in that market alone over 300 per cent."

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THE AUTOCAR COMPANY, ARDMORE, PA.

Motor Delivery Car Specialists **Established 1897**

Sales and Service Plants

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The Commercial Vehicle
Read by Business Men
Vol. XV October 15, 1916 No. 6

Dependable Service Makes Maryland Bus Line A Success in Trolleyless Area

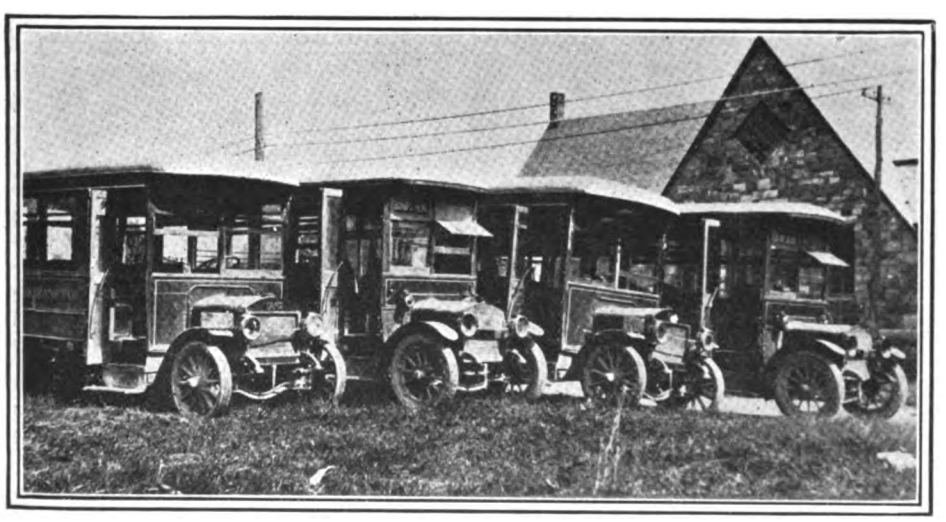
Five Small Buses Under State Direction Profitable on Inter-town Hauls at Tariff of 3 Cents per Mile

By Raymond Allen

FIVE years ago one's friends would have called in an alienist had he suggested such a thing as the organization of a rapid transit company for the purpose of carrying passengers and freight, yet to-day there is such a public service corporation operating in all of the lower counties on the Maryland peninsula. Here in Dorchester County, of which Cambridge is the capital, there are a number of bus lines doing a thriving business this year, all of which will probably meet expenses during the winter months.

In July, 1915, local capitalists and men of affairs in Cambridge and in Dorchester County held a meeting and organized what is now the Cambridge Rapid Transit Co. That they meant business at the very outset is evidenced by the fact that within 30 days from the date of the first meeting the several lines were established and in actual operation. This company, like a few of many others on the peninsula, operates under the direction of the Public Service Commission of Maryland, being held to a strict accountability for the manner in which it serves the traveling public.

The officials of the company, all of whom are representative citizens of Cambridge, are as follows: President, Winder F. Harrington, brother of the present governor of Maryland; vice president, Noah Webster; secretary and legal adviser, Henry L. Johnson; treasurer, W. Nicholas Williams; general manager, D. W. Banning. The board of directors is composed of about twenty-five of the leading business men of the town and county.



Four of the five small buses owned by the Cambridge Rapid Transit Co., Cambridge, Md., and operated on four regular routes in the lower counties of the Maryland peninsula. These buses have proven a success in serving a large territory without trolley or train facilities. They are run under the supervision of the Maryland Public Service Commission and operate on a tariff of 3 cents per mile. All the vehicles shown above are of G. M. C. manufacture, that at the left being of 1½ tons capacity and the others of ¾ tons burden. The former has a seating capacity of eighteen passengers and the latter of twelve each. All of the buses have Jim Crow sections at the rear for colored passengers

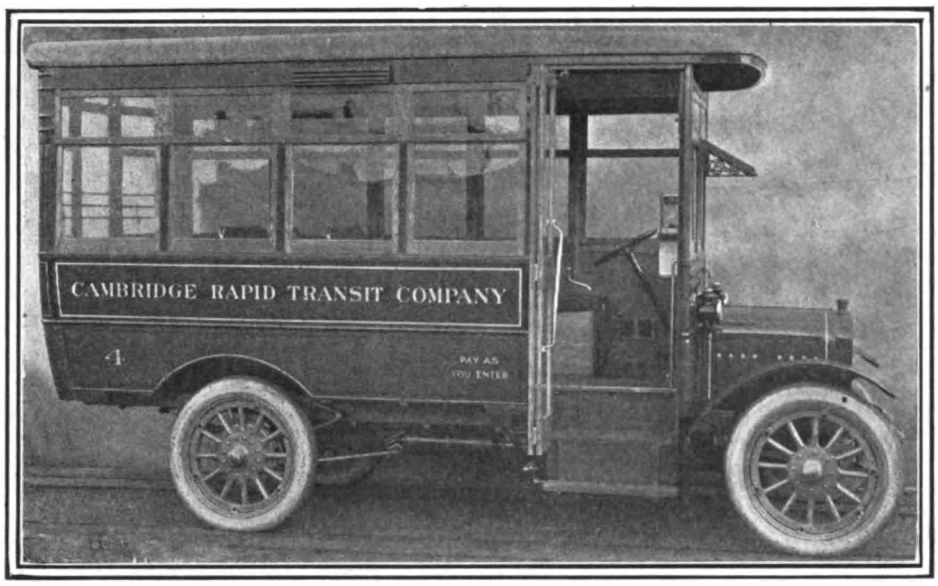
Five Buses Operated

The company owns five buses, one of which is mounted on a 1½-ton White chassis and another on a 1½-ton G. M. C., with the three smaller ones mounted on ¾-ton G. M. C.s. A minute description of their general make-up and arrangement would be superfluous here, as in most respects they are similar to the motor buses now in use in Salisbury, Md., which were fully described in an article appearing in THE COMMERCIAL VEHICLE of July 15.

Record of Year's Operation

The seating capacity of the larger buses is eighteen and of the smaller twelve. The seats are arranged crosswise, like those of a railway coach, and will accommodate two passengers each. There also is a Jim Crow section in the rear of each bus with a continuous seat for five passengers. This section, as its name implies, is for colored people only and, in good old Southern *patois*, will seat and stand some six or seven persons upon a pinch. It frequently happens—and more particularly on Satur-

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A close-up of one of the small ¾-ton G. M. C. buses. Note that the vehicle is mounted on pneumatics all around and that it is one-man operated and has a conventional trolley-car door and folding step and a pay-as-you-enter fare box. The body, which was built by the J. G. Brill Co., Philadelphia, Pa., has the seats arranged crosswise, like those of a trolley car. Each seat accommodates two passengers. A crosswise seat at the rear comprises the Jim Crow section with room for five seated passengers. Note the high headroom of the body and the ventilator at the side near the top

days—that the buses are taxed beyond their carrying capacity, in which event an extra bus and one or two touring cars are sent out to take care of the crowds.

It is now 12 months since the buses started out on their first trips, and, be it said to the credit of the drivers as well as to the management of the company, thus far they have met with a full measure of success—not a single accident or a serious delay of any kind during their first year of service.

Like other towns on the eastern shore of Maryland, Cambridge does not enjoy street-car service. With a population of about 9000, according to the latest police census, it is believed by many that a street-car line serving all sections of the town and outlying districts would soon find iself on a paying basis. Be this as it may, no one has ever seriously considered a proposition of this character, nor is it likely to be considered any time soon. The local bus lines render good service in the town, and probably would continue to do business even with a street railway as a competitor. With both in the field the town, owing to its lack of size, could not give that support to which enterprises of this character are entitled.

No City Service Yet

With the general offices of the Cambridge Rapid Transit Co. located in the town whence it derives its name, it is passing strange that this concern should thus far have made no effort to serve townspeople in a purely local way. On the other hand, owners of individual bus lines have not run counter to the transit people. It has been a live-and-let-live game between all parties, each doing the other a friendly turn whenever he can. It is rumored, however, that the directorate of the Cambridge concern contemplates the purchase of two small buses to take care of the ever-increasing passenger traffic in town.

The four routes of this line traverse rich agricultural sections, in which are a number of small towns and villages without railroad facilities; in fact, the entire line is without opposition of any character whatsoever, which in no small measure is responsible for its financial achievements of late. People living on and contiguous to these routes, and in the towns and villages, who hitherto were strangers to Cambridge, now visit the county seat whenever they so desire, where they do their trading, look after other business matters and talk over the political situation.

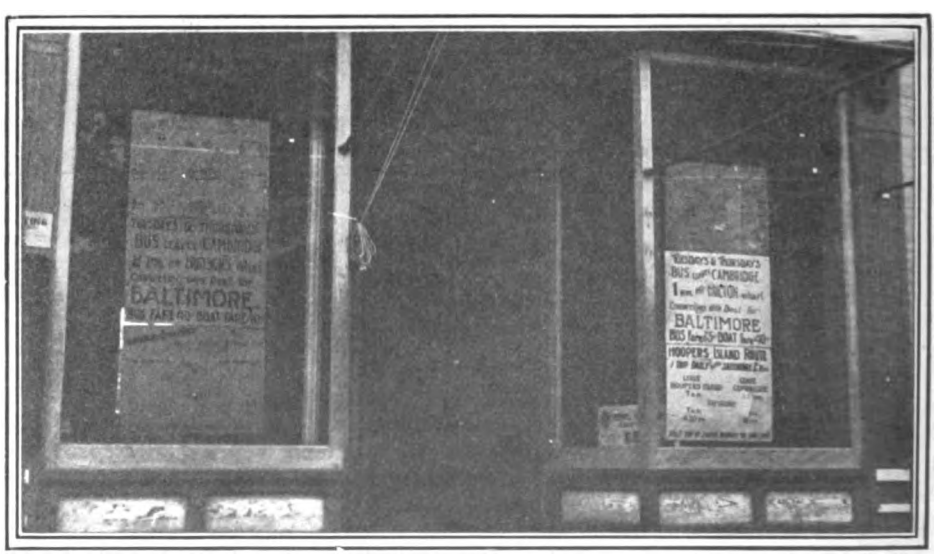
From time immemorial county folks in the lower sections of Dorchester have traded in Salisbury. To reach Cambridge by the land route meant a drive of 40 miles or more and the loss of 2 days, while by the water route it was equal to a journey around Robin Hood's farm. If stormy weather prevailed it was like swinging around the Horn. The water route from those sections to Salisbury is direct and, with the locomotive whistle 40 miles away, it was but natural that Salisbury should have gotten the trade—all of which, be it said to the credit of the motor bus lines from Cambridge, has been diverted to the latter town.

Four Routes Covered

Of the four routes covered by the transit company, that of Hooper's Island exceeds all others in length, the distance from Cambridge to Middle Hooper's Island being a trifle over 30 miles. The run is made in 2 hours and 35 min., which is at the rate of 12 miles per hour. Next comes Bishop's Head, which is 25 miles, followed by Taylor's Island and Hudson, the two latter 18 and 13 miles respectively. The fifth, or auxiliary bus, runs what is known as the Short Line from Cambridge to Milton, a distance of 10 miles, where it connects with the Tolchester Steamboat Co.'s steamer *Emma Giles* for Baltimore. These trips are made on Tuesdays and Thursdays, the fare from Cambridge to Baltimore being 65 cents one way. Passenger traffic on this route is quite heavy, the trifling fare to Maryland's metropolis being the chief attraction. When not on the Milton route this bus fills in on the others, travel being very heavy during the open season.

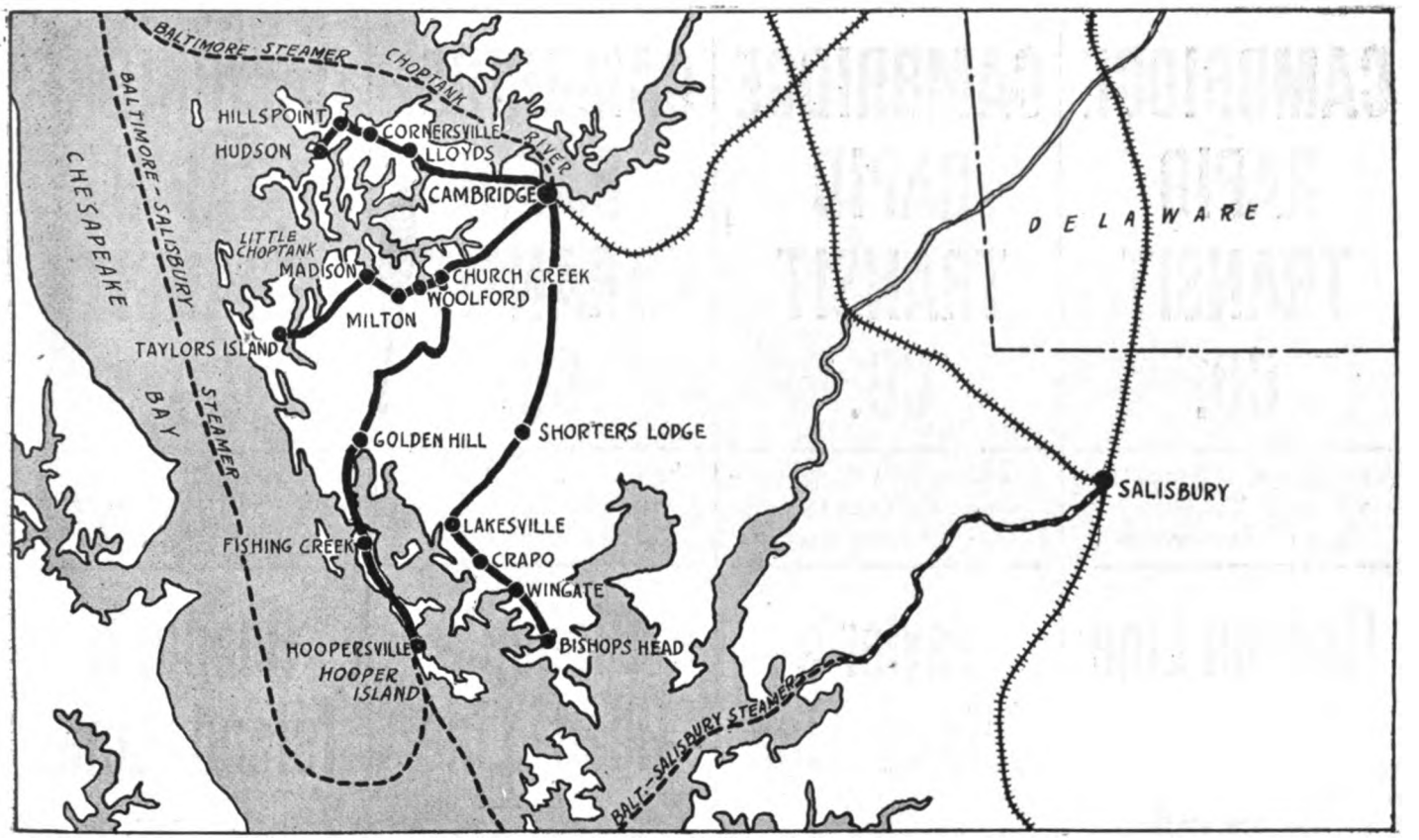
Fares Up to 90 Cents

The fares range from 10 to 90 cents, and, as will be noted in the schedule, are based on a tariff of 3 cents per mile. The old tariff was 2½ cents, being super-



A close-up view of the windows of the office and waitingroom of the Cambridge company, showing the large posters giving the leaving time of the buses, the days of the week each route is covered and the fare which is based on a tariff of 3 cents per mile

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Map of the lower counties of the Maryland peninsula showing its relation to the southwestern corner of Delaware and Chesapeake Bay. Cambridge, the starting point of the four routes over which the buses of the Cambridge Rapid Transit Co. run, is shown in the upper left center. The heavy black lines indicate the routes. One leads from Cambridge through Lloyds, Cornersville and Hillspoint to Hudson, a total distance of 13 miles. This is the shortest of the routes to be followed by that to Taylor's Island, a distance of 18 miles. Next in length is the run to Bishop's Head through Shorter's Lodge, Lakesville, Crapo and Wingate, a total distance of 25 miles. The longest route is that from Cambridge to Hooper's Island, a distance of 30 miles, which is covered in 2 hours, 35 minutes, or at the rate of about 12 miles per hour. An additional route is covered twice a week from Cambridge to Milton, a distance of 10 miles, where the buses connect with a steamboat line to Baltimore

seded by the present one in June. Even with this increase, travel is becoming heavier every day. Freight and express also are carried, on which the rate is 5 cents for a single pound and ½ cent for each additional pound or fraction thereof. For example, a package weighing 11 lb. will cost 10 cents, let its destination be where it will on the route.

Buses Are Popular

Daily trips are made on the Hooper's Island, Bishop's Head and Taylor's Island routes, save on Saturday, when two trips are made. On the Hudson route two daily trips are made, with an extra trip on Saturday. Sunday trips also are made, which are 1 hr. later than regular schedule time. These runs are quite profitable, being liberally patronized by the young folks of Cambridge and the rural districts. Between 1500 and 1800 passengers a week are carried, the buses being crowded the greater part of their runs.

Buses Pay Profits

Conservative business men of Cambridge and of Dorchester County unite in declaring that the Cambridge Rapid Transit Co. is now firmly established and on a paying basis. And there is every reason for accepting their statements as truth, as with no opposition of any kind, and traversing a section in which truck farms and fruit orchards prevail and in which the Chesapeake Bay oyster waxes fat, it would show poor management indeed upon the part of those directly connected with the company should the total receipts at the close of the fiscal year not exceed the expenditures. It is an inviting field and the Cambridge Rapid Transit Co. is a money-making proposition.



The office and waitingroom of the Cambridge Rapid Transit Co., in Cambridge, Md. Note the schedules of the routes in each window. All four of the regular routes covered start from in front of the office. The type of house shown is typical of those in the business section of the town

Trucks Help Build Arizona Road

Rapid work is being done on 16 miles of Warrenite paving out of Yuma, Ariz., by the O. & C. Construction Co., under exceptionally difficult conditions, thanks to modern hauling equipment. The outfit consists of four 5-ton Garford trucks, each equipped with two Troy 5-ton trailers. Both trucks and trailers are equipped with dumping bodies, and modern overhead hopper loading is employed.

Delay in loading and unloading is thus eliminated, one of the trailers for each truck being loaded while the other is being hauled to the unloading point, so that, save for the brief time required to dump it and its trailer's load and to receive its own load from the hopper and couple onto the loaded trailer, the truck is moving constantly.

A slight overload is carried, 11 tons to a load being hauled continuously. The first of the season these trucks worked 22 hr. a day, and in March and April hauled 27,000 tons of material, sand, gravel and hot asphalt.

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CAMBRIDGE RAPID TRANSIT CO.

The Cars will Stop Anywhere to Take On or Let off Passengers

Hudson Line

East Bound

	Fare	A.M.	P.M.	P.M.
Sewards		7.55	12.55	5.55
12 Mile Post	5c	8.00	1.00	6.00
10 Mile Post	10c	8.12	1.12	6.12
7½ Mile Post	15c	8.24	1.24	6.24
5 Mile Post	25c	8.36	1.36	6.36
2½ Mile Post	30c	8.48	1.48	6.48
Cambridge	40c	9.00	2.00	7.00

West Bound

	Fare	A.M.	P.M.	P.M.
Cambridge		11.00	4.00	10.00
2½ Mile Post	10c	11.12	4.12	10.12
5 Mile Post	15c	11.24	4.24	10.24
7½ Mile Post	25c	11.36	4.36	10.36
10 Mile Post	30c	11.48	4.48	10.48
12 Mile Post	35c	12.00	5.00	11.00
Sewards	40c	12.05	5.05	11.05

First Trip Up Sunday Morning One Hour Later

Last Trip Saturday Leave Cambridge at 10.30 o'clock P. M.

CAMBRIDGE RAPID TRANSIT CO.

The Cars will Stop Anywhere to Take On or Let off Passengers

Taylor's Island Line

North Bound

	Fare	A.M.	P.M.
Taylor's Island		8.00	5.30
Madison	15c	8.25	5.55
Woolfords	25c	8.45	6.15
Church Creek	30c	8.55	6.25
Christ Rock	40c	9.10	6.40
Cambridge	50c	9.25	6.55

South Bound

	Fare	P.M.	P.M.
Cambridge		2.00	10.00
Christ Rock	10c	2.15	10.15
Church Creek	20c	2.30	10.30
Woolfords	25c	2.40	10.40
Madison	35c	3.00	11.00
Taylor's Island	50c	3.25	11.25

First Trip Up Sunday Morning One Hour Later

On Saturday Bus Runs by Old Three Trip Schedule

CAMBRIDGE RAPID TRANSIT CO.

The Cars will Stop Anywhere to Take On or Let off Passengers

Bishop's Head Line

North Bound

	Fare	Daily Except Tues., Sat. and Sun. A.M.	Tues. Sat. Sun. P.M.
Bishop's Head		7.00	4.30
Teddville	5c	7.20	4.50
Wingate	10c	7.35	5.05
Crapo	15c	7.45	5.15
Lakesville	20c	8.00	5.30
Andrews	25c	8.15	5.45
Shorter's Landing	30c	8.30	6.00
Cambridge	75c	9.35	7.05

South Bound

	Fare	Daily Except Tues., Sat. and Sun. P.M.	Tues., Sat. and Sun. P.M.	P.M.
Cambridge		3.30	1.30	9.30
Shorter's Ldg.	45c	4.35	2.35	10.35
Andrews	50c	4.50	2.50	10.50
Lakesville	55c	5.05	3.05	11.05
Crapo	60c	5.20	3.20	11.20
Wingate	65c	5.30	3.30	11.30
Teddville	70c	5.45	3.45	11.45
Bishop's Head	75c	6.05	4.05	12.05

First Trip Up Sunday Morning One Hour Later

Last Trip Saturday Leave Cambridge at 10.00 o'clock P. M.

CAMBRIDGE RAPID TRANSIT CO.

The Cars will Stop Anywhere to Take On or Let off Passengers

Hooper's Island Line

North Bound

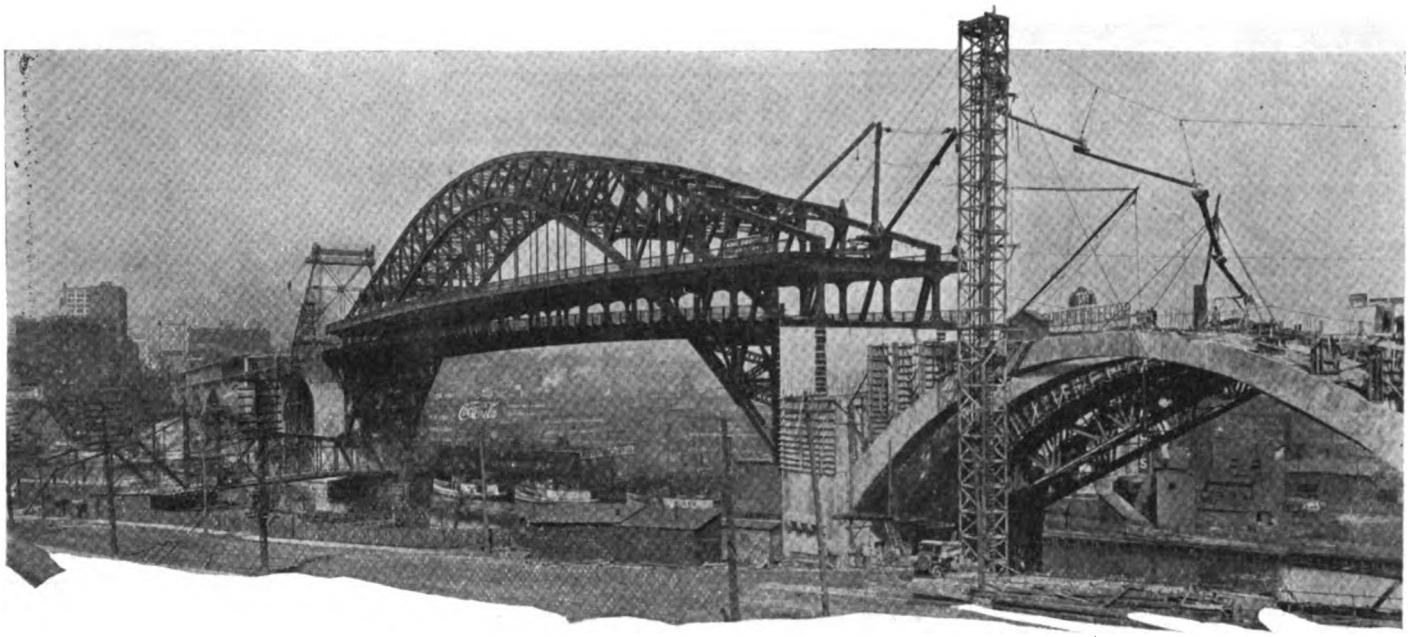
	Fare	A.M.	P.M.
Middle Hooper's Island		7.00	4.30
Upper Hooper's Island	15c	7.30	5.00
Meekins Neck	25c	7.50	5.20
Golden Hill	35c	8.10	5.40
17½ Mile Post	40c	8.15	5.45
15 Mile Post	45c	8.30	6.00
12½ Mile Post	50c	8.40	6.10
10 Mile Post	55c	8.55	6.25
Church Creek	70c	9.10	6.40
Cambridge	90c	9.35	7.05

South Bound

	Fare	P.M.	P.M.
Cambridge		1.00	9.30
Church Creek	20c	1.25	9.55
10 Mile Post	35c	1.40	10.10
12½ Mile Post	40c	1.55	10.25
15 Mile Post	45c	2.10	10.40
17½ Mile Post	50c	2.20	10.50
Golden Hill	55c	2.25	10.55
Meekins Neck	65c	2.45	11.15
Upper Hooper's Island	75c	3.05	11.35
Middle Hooper's Island	90c	3.35	12.05

First Trip Up Sunday Morning One Hour Later

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Cleveland's new high-level bridge over the Cuyahoga river

Trucks Help Build Cleveland's New $4,000,000 Bridge

MOTOR trucks have played a most important part in the construction of Cleveland's new $4,000,000 two-decked, high-level bridge. That structure will be the longest double-decked, three-hinged, steel-arched bridge in the world and when completed will put the west side of Cleveland and its 300,000 population in direct communication with the city's downtown business district.

The new bridge will replace the old Superior viaduct which was built in 1875 at a cost of more than 1½ millions, but which is now entirely inadequate due to the rapid growth of the city and its tremendous increase in traffic. The fact that the old bridge was of the draw type was another serious handicap, as it had to swing open many times a day to allow lake freighters to pass up and down the Cuyahoga River. This delayed traffic from 10 to 20 min. every time the draw was open and caused serious traffic congestion which resulted in numerous accidents.

Ships Pass Under New Bridge

The new bridge will be of sufficient elevation to allow ships to pass beneath it. It is estimated that the upper level of the bridge, which is designed for vehicular and pedestrian traffic, will be opened by November, 1916, and the lower level, for surface cars, by the latter part of 1917.

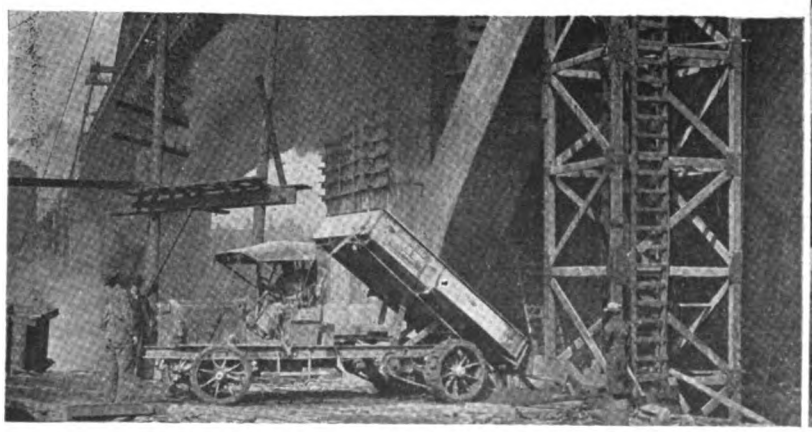
White trucks played an important part in the vehicular haulage in conjunction with the work, no less than forty-four being engaged by eight different contractors and building material companies. It is said these vehicles hauled over 60 per cent of the thousands of tons of material used in the construction of the bridge.

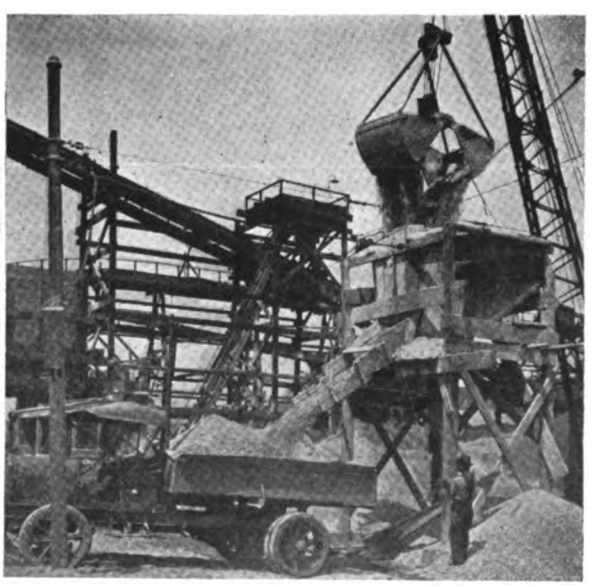
Trucks Haul Wet Concrete

The trucks performed a double duty in hauling the concrete work. First they hauled the cement, sand, gravel, slag and limestone to the mixer. Then, after these ingredients had been properly mixed, they hauled the plastic concrete to the forms. The speed of the trucks in this work was of great importance because they offered the only means that enabled the contractors to secure the materials in sufficient quantities to keep the giant mixers busy without congestion. In hauling the mixed concrete to the forms all the units of the job had to be poured continuously and it was thus necessary that the handling be done without interruption.

The Hunkin Conkey Construction Co., which holds a million dollar contract for building a portion of the structure, at first had to pay an extra price for all concrete material delivered to the job by vehicles of the supply houses. It then purchased another White truck to haul its own material from the docks, with the idea that the truck would pay for itself by the difference in the cost of hauling. The contract is now 75 per cent completed and the truck has already paid for itself and besides has been able to haul other material such as re-inforcing steel, supplies, concrete forms, etc.

(*Continued on page* 31)





At the left is shown one of the White 5-ton dumping trucks used in the bridge work in the act of dumping a capacity load of wet concrete into a bucket at the bottom of one of the high wood towers. The concrete is then hoisted to the top by a steam engine and winch, where it is re-distributed to the forms to be filled by means of gravity pipe chutes to the latter. At the right is another White 5-tonner receiving its load direct from an overhead bin which is filled by means of a locomotive crane

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Men Who Fail

THE man shown in the accompanying illustration is a failure. He is a failure because he is a waster of time—that priceless possession of every individual. Because he is a waster, a shirker, he deserves failure. He merits no sympathy. He insists in smashing his head against the door of opportunity instead of pushing it open with his hand.

Unfortunately there are many such men. More unfortunate still, many of them are instructed with the care and operation of motor trucks. That the man who persists in wasting time will fail is of small moment. He deserves his fate.

It is the truck which will suffer. Perhaps the truck installation will fail and conceivably the business of the owner as well. A waster of time at the wheel of a truck hurts not only himself but his truck, his employer and his employer's business. He is unfair to the truck.

Trucks were made to run, to be in actual motion the greatest possible time. They never made a cent for their owners while standing still. Idle trucks are a mere repository for their goods, and expensive ones into the bargain.

A waster of time who drives a truck wastes the truck's time as well as his own. He makes the cost of the truck delivery or haulage higher than it should be. He is responsible for the truck handling less goods than it should. He makes for high truck cost. High truck cost may result in the owner's dissatisfaction with trucks.

The employer of a waster of time is equally as guilty as the shirker himself. The former's responsibility lies in the fact that he allows such a condition to exist. He should make it impossible for his drivers to soldier on the job without detection. Turn the light on shirkers, and, like exposed evils, they usually cease to exist as such.

Wasters of time who drive trucks can also usually be found to practice similar delections from duty in other ways. A man who will loaf on the road to make it impossible to take out another load may loaf too long and then overspeed his truck to make up for it. When overspeeding he is liable to become careless. Accidents are expensive. They always cost somebody money. In the case of a motor truck, it is usually the owner who has to pay.

A driver who will take chances with his truck is also liable to keep his engine running too long and too fast, when stopping, to avoid cranking it to start.

A man who will soldier on the road to make it unnecessary to take out another load is also liable to overload his truck to avoid making a second trip. He will probably abuse his vehicle in many other ways. He may neglect its proper inspection, oiling and greasing. A waster of time behind the steering wheel in the cab of a motor truck has no place in this day of efficient motor transportation.



By Courtesy the New York Evening World, Sept 18, 1916

"I'LL STALL AROUND TILL QUITTING TIME SO THEY WON'T SEND ME ON ANOTHER DELIVERY."

In addition, one shirker among a crew of drivers of a fleet of trucks who is not detected and made to cease his time-wasting tactics, is also liable to cause the other members of the organization to similarly waste their time. The larger the fleet, the greater the time and earning capacity lost.

Besides the effect on the truck owner, we must also consider that on the truck maker. If the trucks do not earn what they should, he suffers in the exact ratio with them. Let us eliminate the shirker by eliminating the conditions responsible.

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Horse Vehicle Makers Find Times Bad

Business, Even With War Boost Slumps—Urge Standards

CINCINNATI, OHIO, Oct. 2—At the convention of the Carriage Builders' National Assn., held at the Hotel Sinton here last week, it was shown that the production of horse vehicles has been cut in half in 10 years. During this same period motor vehicle production has about quadrupled.

Great emphasis was laid upon the need of standardization in horse vehicle construction, taking a leaf from the book of experience in the motor vehicle field. It was agreed by eighteen leading builders to increase prices for carriages 20 per cent, the increase being attributed to the European war. This cause, however, was called by the president of the organization, P. E. Erbenz, the reason for the very continuance of the industry, as exportation of carriages to South America has increased enormously since 1913.

O. B. Bannister, chairman of the committee on statistics, produced figures to show that the production of carriages had decreased from 1,500,000 in 1906 to 750,000 in 1916.

15 TRAILER MAKERS FORM NEW ASSOCIATION

DETROIT, MICH., Oct. 10—Fifteen trailer manufacturers met here to-day and formed a permanent organization to be styled the Trailer Manufacturers Assn. of America. It contemplates a model trailer ordinance and other legislation and publicity. The officers are: President, C. A. Geiger, president Troy Wagon Works, Troy, N. Y.; vice-president, Miss K. Gleason. Rochester Trailer Co., East Rochester, N. Y.; secretary-treasurer, J. C. Endebrook, Sechler Co., Cincinnati. The temporary chairman was C. W. Shipley, of the Sechler Co. A. W. Keesler, Watson Wagon Co., Canastota, N. Y., acted as temporary president. An executive committee of four was named.

TRUCK BOOM AMONG KANSAS LAUNDRIES

KANSAS CITY, MO., Oct. 3—Kansas City laundries are gradually eliminating the horse and wagon from use and are installing motor service. This is the opinion of the heads of practically all the large laundries in Kansas City. Three years ago there were but a few delivery trucks in use by laundries, while now the greater portion of delivery work in Kansas City is done this way. Walker's Laundry, the Silver Laundry, Gillpatrick's, Ford's Laundry, the Ideal, Graham's, and, in fact, all the important ones, have each from three to fifteen trucks. Graham's, Walker's and Gillpatrick's lead, with over ten each.

The truck is being used in the suburban districts, say the laundry owners, while those routes within a short radius of the plant are served by the horse. All of the above-mentioned laundries are in the congested downtown district.

The general opinion of the laundry owners is that the wear and tear on a machine in stopping and starting so often is not offset by the time saved. Most of these men say the big saving in the use of a truck is in the speed at which the route is reached. A horse can stop easier, they seem to believe, than can a truck. For this reason all of the work in the suburban districts is handled by trucks. Sooner or later, the belief is, practically all delivery done by laundries will be by truck service.

S. A. E. STANDARDS COMMITTEE TO MEET AT STANDARDS BUREAU

NEW YORK CITY, Oct. 10—By the courtesy of Dr. Stratton, the October meeting of the S. A. E. standards committee will be held in the U. S. Bureau of Standards at Washington next Wednesday. On Monday and Tuesday there will be various division meetings and these may also be held in the bureau.

The military truck specifications will be discussed informally. The proposed details of standard truck control will be ready for acceptance.

ALUMINUM, TOPIC FOR S. A. E.

NEW YORK CITY, Oct. 10—Aluminum will be discussed at the October meeting of the Metropolitan Section, Society of Automobile Engineers, by J. E. Diamond of the Aluminum Castings Co., Cleveland, Ohio. The meeting will be held at the Automobile Club of America, Fifty-fourth Street, just west of Broadway, on Oct. 19, at 8 p. m.

The October session is the first to be held since the August meeting, at which David Beecroft presented an illustrated lecture on motor vehicle possibilities in South America.

CITY GARAGE FOR BOSTON

BOSTON, MASS., Oct. 7—The Finance Commission has just completed an investigation of costs of maintenance of the motor vehicles owned by the City of Boston, and as a result it has recommended that Mayor Curley begin plans at once for the building of a municipal garage. There is a large lot of land available owned by the city in a very central location, and it would be possible for Boston to erect a garage there to house the motor trucks and cars. The Finance Commission states that it has investigated the Municipal Garage conducted at New York and finds that the cost to the city there has been materially reduced. Boston is increasing its vehicles all the time and at present the Fire Department has its own repair shop independent of the other departments, while the police work is done wherever the officials care to have the machines sent. The other city departments garage their vehicles wherever the owners care to place them, and they have repairs made anywhere. Some time ago Mayor Curley, in a plan to decrease expenses, told all the heads of departments to learn to drive their machines and so cut off the chauffeurs.

15 Truck Exhibits at Providence

Accessories Crowded—Special Building for Vehicles

PROVIDENCE, R. I., Oct. 6—A special room, 200 ft. long by 90 ft. wide, has been set apart by the Providence dealers for trucks at the motor vehicle show to be held next month. Fifteen makes will be on view. Last year the trucks occupied a part of the same space, sharing it with accessories, but this year the truck exhibits are so large that the accessories have been crowded out and have to occupy a separate department.

The trucks are all exhibited by dealers, as follows:

Autocar, Autocar Sales & Service Co.
Chase, Harold L. Crone.
Federal, Robert W. Powers.
Garford, R. E. Taylor Corp., Boston.
G. M. C., A. J. Felthan.
Mack, B. F. & A. W. Hopkins.
Overland, Pugh Bros. Co.
Packard, Packard Motor Car Co., Boston.
Peerless, Joseph McCormick.
Pierce-Arrow, Foss-Hughes Co.
Reo, B. F. & A. W. Hopkins.
Republic, John O'Donnell.
Studebaker, Kenworthy-Clark Co.
Vim, Vim Motor Sales Co.
White, Robert Lippitt Knight.

TRUCKS DRAW BROCKTON FAIRGOERS

BROCKTON, MASS., Oct. 3—Motor trucks form an important feature of the automobile exhibition in connection with the annual Brockton Fair that opened here to-day for a 4 days' exhibition. The show is more comprehensive than any of its kind ever held in New England, for the officials erected a special building at a cost of $25,000, and when it was finished it was not large enough to hold all who wanted to get in, so an overflow is housed in a big tent. Brockton is on the main road between Boston and Providence and the other State road to the Cape passes through here. Because of the many big shoe factories, there are a lot of trucks used here, running to Boston, Fall River, Providence and New Bedford, with shipments to steamers. To care for the heavy traffic the State Highway Commission built part of the road with concrete.

The exhibits are divided between the main building and the big tent beside it. There are eight firms exhibiting trucks and two tractors are also there. The Packard company has the larger exhibit. It is in the main building and comprises, in addition to fire apparatus, three trucks of the 1- and 3-ton types and two passenger cars. The White Co. has three trucks of the ¾-, 1½- and 3-ton chassis. The Garford line has three models and there are three Jefferys. The Denby is represented by three, and there are two Michigan trailers, two Vims and one Smith Form-A-Truck. There are twenty other passenger car exhibitors, the whole show having about 125 machines.

Near by are the tractors. The J. I. Case Co. is showing one through the Ames Plow Co., a small machine with a four-cylinder motor that burns kero-

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sene and will plow an acre an hour at a cost of about 20 cents. Then there is the massive Lenox American tractor, that is to be made by the Lenox Motor Co. of Hyde Park, Mass., and costs $4,800, but is modern, with its starter, etc.

A number of the Boston motor dealers will attend the fair. It is estimated that the attendance will reach more than 150,000, and many of these will see the motor exhibit because of its prominent position in the new building between the race track and the cattle ring, the two big attractions. All the makes of big tires and other accessories are shown in the balcony of the building.

NEW G. V. SHOWN AT ELECTRICAL EXPOSITION

NEW YORK, Oct. 14—Several new things of interest to motor truck users are exhibited at the Electrical Show at Grand Central Palace. Of startling interest is a new small-capacity alternating-current rectifier shown by the General Electric Co. An entirely new principle is used, the gas in the bulb being argon instead of mercury vapor. Argon resembles nitrogen in its properties, and is found in small quantities in the atmosphere. It has several advantages of the mercury arc rectifier. It is inherently self-starting, 25 per cent cheaper to build and operate, slightly more efficient, more compact, requires less auxiliary apparatus. and, most important of all, it can be made in very small sizes for charging even a single storage battery, ringing an electric bell or winding a clock. At present it is made in two capacities—2 and 6 amp. The smaller delivers 1 amp. at 15 volts or 2 amp. at 7.5 volts, and costs $14. The larger is of 75 volts, and will charge up to 30 cells or ten three-cell batteries. It is equipped with an ammeter, and sells for about $100.

The bulb resembles the mercury bulb to some extent, except that argon is the medium which is used to conduct a one-way current from the anode to the cathode instead of mercury vapor. The anode, or positive pole, is graphite, and the cathode. negative pole, is tungsten, and the latter so acts on the gas that it becomes a one-way electrical conductor; that is, the current can pass from the anode to the cathode, but not in the reverse direction.

The efficiency of the smaller instrument is 42 per cent and the larger 83 per cent, it is claimed. The life of the bulb on the smaller is 1500 to 2000 hr. and on the larger 2000 to 2500 hr., and the cost is respectively $3 and $7.50.

A 6-ton heavy-duty truck is a new model shown by the General Vehicle Co., Long Island City. N. Y. A heavy-duty truck. by the way, is one which carries a dead weight, such as coal. sand, etc., as distinguished from furniture, groceries, meats, etc., and goods having resiliency. Naturally the dead weight requires a heavier construction. It has a particularly convenient demountable battery cradle, which is so designed that it may be removed either by dropping in place or sliding out to one side.

Its speed is 6 m.p.h. and it will operate about 30 miles on a charge, having a 44-cell G. V. Exide battery. It is priced at $5300 with its body. An interesting feature of the body shown, which was for delivering coal, was the use of a Wood hydraulic hoist driven by an electric motor so that raising the body and discharging the load could be done from the seat.

Decade Sees Tripled Road Expenditure

11.3% of U. S. Roads Improved —States Spending More

WASHINGTON, D. C., Oct. 2—Rapid increase in total expenditures for roads and bridges, growth of building and maintenance activities under State supervision, and a sharp decrease in the proportion of contributions in the form of statute labor mark the development of highway work in the United States during the past 12 years. These facts are brought out by statistics for the calendar year 1915 recently compiled by the Office of Public Roads and Rural Engineering of the U. S. Department of Agriculture.

The total length of public roads in the United States outside the limits of incorporated towns and cities was about 2,452,000 miles on January 1, 1916. Of this, about 277,000 miles, or 11.3 per cent, were improved with some form of surfacing. The mileage of surfaced roads has been increasing at the rate of about 16,000 miles a year, and in 1915 approximately one-half of this increase was made under the supervision of State highway departments. In addition, these departments supervised the maintenance of nearly 52,000 miles of main and trunk line roads.

The increase in expenditures for road and bridge work in the United States has been from approximately $80,000,000 per year in 1904 to about $282,000,000 in 1915, an increase of more than 250 per cent. The expenditure of State funds during the same period increased from about $2,550,000 to more than $53,000,000. In addition, more than $27,000,000 of local funds was spent under State supervision in 1915, bringing the total road and bridge expenditures managed by the States to $80,514,699. This amount is greater than the total expenditures for roads and bridges from all sources in 1904.

The growth in importance of the State highway departments has been rapid. The first of these agencies was created in 1891 in New Jersey, and now some form of highway department exists in every State except Indiana, South Carolina and Texas. Since their inception these departments had expended to Jan. 1, 1916, an aggregate of $265,350,825 in State funds for road and bridge construction, maintenance and administration. They had constructed over 50,000 miles of roads in co-operation with the States. More than 40,000 miles of these roads were surfaced.

The falling off in the value of road work performed by statute and convict labor was from $20,000,000 in 1904, when the total road expenditures were $80,000,000, to about $15,000,000 in 1915, when the total expenditures had grown to $282,000,000. This was a reduction of 25 per cent of the total in the former year to less than 5½ per cent of the total in 1915.

An increase in the use of better and more expensive types of roads also is shown by the recently compiled statistics. This development has been due, in large part, to the great increase in motor traffic. It is estimated that there are now approximately 2,500,000 motor vehicles in use on the roads of the country, or one for every mile of road. This present motor traffic is in excess of traffic of all sorts 12 years ago.

The cash road and bridge expenditures of the United States averaged only $28 per mile of rural roads in 1904. In 1915 this average had grown to $109 per mile. New Jersey led all other States both in 1904 and in 1915, with $221 and $475 per mile respectively. Nevada made the least expenditure in both years—$3.72 per mile in 1904 and $17 per mile in 1915.

SCIENCE IN ROAD WORK

NEW YORK CITY, Oct. 2—Road building is developing a new science that calls for the highest engineering skill, says Roy D. Chapin, chairman of the Good Roads Committee of the National Automobile Chamber of Commerce.

In Massachusetts, 82½ per cent of all traffic on the State highway system las year was motor driven. In New York City, motor cars, motor trucks and motor buses constitute nearly 7/10 of all wheeled traffic exclusive of street cars and motorcycles. Similar conditions will soon prevail in all parts of the country.

Rapidly changing traffic conditions demand the services of technically trained men who are not only qualified civil engineers, but who have made a study of road economics and the wearing qualities and cost of construction and maintenance of different kinds of pavements, because the proper administration of road affairs is more essential than the highest degree of engineering skill.

Too often faulty road conditions are due to too small appropriations in the endeavor to make a cheap surface endure under heavy traffic. Where traffic of any consequence exists, the cheapest road to build is usually the most expensive in the end. Efficient highway engineers will save taxpayers millions of dollars in years to come by the selection of proper materials and high-class construction work.

Some of the States and cities require candidates for appointment to the highway departments to pass a civil service examination, thus removing the offices from political influence. This is greatly to be desired. Men who have shown good administrative ability should be continued in office. In the communities where this policy has been followed there is general satisfaction with road and street conditions.

Coming Commercial Vehicle Events

Oct. 11-21	New York City, Electrical Exposition and Motor Show, Grand Central Palace.
Oct. 18	New York City, Monthly Meeting of the Motor Truck Club of America, Automobile Club of America, 247 West Fifty-fourth Street.
Oct. 19	Newark, N. J., Monthly Meeting of the Motor Truck Club of New Jersey, New Jersey Automobile Club, 22 Washington Place.
Nov.	Providence, R. I., Annual Motor Vehicle Show.
1917	
Jan. 13-20	Montreal, Que., Can., Montreal Motor Show.
Feb.	Newark, N. J., Passenger Car and Motor Truck Show, First Regiment Armory.
Feb. 3-10	Minneapolis, Minn., Tenth Annual Auto Show.
March 3-10	Boston, Mass., Fifteenth Annual Motor Vehicle Show, Mechanics' Building.

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Smith Gets License to Cook Patent

Recognizes Validity—Must Pay Royalty to Redden Firm

NEW YORK CITY, Oct. 4—The Smith Form-A-Truck Co., Chicago, has taken out a license from the Redden Motor Truck Co.. this city, to manufacture converted trucks from passenger cars, under the Cook patent, controlled by the Redden company. The Smith company has up to the present converted Ford passenger cars into delivery vehicles, having as its patent in this work No. 1,147,131, granted to W. P. Wynne, July 20, 1915, and applied for June 29, 1914. The Redden company controls patent No. 1,180,475, granted to A. E. Cook and T. Van Tuyl, April 25, 1916. It was applied for under date of Dec. 17, 1910.

The Smith Form-A-Truck Co. will continue manufacture of apparatus for converting Ford passenger cars into delivery vehicles as heretofore, but will do so by payment of royalty on the Cook patent. The contract between the Redden and Smith firms is apparently based on the validity of this patent. The Smith Form-A-Truck Co. is one of the largest manufacturers of these truck-making attachments. It was in 1914, when A. D. Smith built his first truck attachment in Seattle, Wash. In May, 1915, the first one for the Chicago trade was manufactured. In August, 1915, the Smith Form-A-Truck Co. established a Chicago plant and started the manufacture of these attachments on a large scale.

The scope of the Cook patent is well defined in some of the patent claims, No. 32 of which reads:

> The combination with an automobile of a pair of tractor wheels, a frame supported thereon and affording means to elevate the rear end of the automobile thereon, means on said frame for rigidly engaging the rear end of the automobile thereon, means supporting the front end of the frame on and securing the same to the front end of the automobile, and driving connections between the tractor wheels and the power plant of the automobile.

REO BUILT 2551 TRUCKS

LANSING, MICH., Oct. 5—The Reo Motor Truck Co., recently amalgamated with the Reo Motor Car Co., in its fiscal year of 1916 produced 2551 trucks, valued at $3,521,000. This was an increase of 33.38 per cent over the fiscal year previous, despite the fact that it was practically all domestic business.

RAINIER MOVES OFFICE

NEW YORK CITY, Oct. 6—The Rainier Motor Corp. has moved its executive offices from 299 Madison Avenue to Broadway and Fifty-first Street. this city. It has secured a factory in Flushing, L. I., where the trucks are now being produced.

TRUCKS AT DAIRY SHOW

SPRINGFIELD. MASS., Oct. 2—Motor truck dealers in this city will have two opportunities to display their goods this fall. The officials of the big dairy show, which is to attract people from all over the United States, has set aside a large plot for motor vehicles, tractors, etc.

Then the regular motor show will be held at the Auditorium during the week of Dec. 2-9. Harry W. Stacey, who had charge of the show a year ago, is to conduct it again. He has sold space to a number of dealers and the exhibition will be larger and more successful than its predecessors.

1¼ MILLION AUTOCAR BOND ISSUE

PHILADELPHIA, PA., Oct. 7—Funds for financing its expanding business are being obtained by the Autocar Co., Ardmore, Pa., by an issue of 5 per cent first mortgage bonds of a total value of $1,250,000. These bonds are serial, maturing semi-annually from April 1, 1917, to Oct. 1, 1921, $125,000 at a time.

The bonds are offered for sale by Montgomery, Clothier & Tyler, New York City, at par plus accrued interest.

REPUBLIC ON OVERLAND TRAIL

DETROIT, MICH., Oct. 5—A 1500-lb. Dispatch model of the Republic Motor Truck Co. started from this city to-day on a transcontinental run. The truck is driven by Lester Peyer and the run will last 6 weeks.

GRAY, H-B PRESIDENT

PHILADELPHIA, PA., Oct. 7—At a meeting of the board of directors of the Hess-Bright Mfg. Co. of this city, manufacturers of ball bearings, held yesterday, B. D. Gray was elected president of the company. Mr. Bright remains identified with the company as chairman of the board.

TIMKEN GETS BACK WEAVER

DETROIT, MICH., Oct. 12—R. B. Weaver has returned to the Timken-Detroit Axle Co. as chief engineer, succeeding J. G. Perrin, who resigned.

MOTOR STEELS SCARCE

NEW YORK CITY, Oct. 12—Soft steel bars are much in demand, some 50,000 tons of this stock being demanded in Detroit. Instead of steel salesmen peddling their wares among the different plants, as in former times, steel buyers are trying to get their orders accepted. So contracts for 15,000, 8000, 6000 and 3000 tons are waiting.

NATCO TRUCK DROPPED

BAY CITY, MICH., Sept. 18—The Natco truck, a 1-ton vehicle, produced by the National Motor Truck Co. of this city for several years, has been discontinued.

MOTOR TRUCKS ARE BARRED FROM CLEVELAND SHOW

CLEVELAND, OHIO, Oct. 9—There will be no trucks in the coming Cleveland automobile show to be held at the Coliseum beginning Dec. 30.

The decision, which was announced to prospective exhibitors last week, is believed to mean a greater variety of passenger car exhibits and it is thought will bring more interest to the vast majority of persons attending the show.

1,565 Truck Exports Last August

49 Fewer Than a Year Before Worth $54,965 More

WASHINGTON, D. C., Oct. 2—Commercial vehicle exports for August, 1916, were only 49 vehicles fewer than a year ago, being 1565, as against 1614. These trucks were valued at $4,442,158, while the greater number of 1915 were worth but $4,387,193. showing that the business in trucks that is being done with Europe is still increasing despite the large numbers that have been sent into foreign markets. For the 8 months ending in August the total exports were 12,938, valued at $35,167,840.

PEERLESS EXPORTING 100 TRUCKS WEEKLY

CLEVELAND, OHIO, Oct. 5—The order for motor trucks recently given to the Peerless Truck & Motor Corp. has been increased from sixty a week to 100 a week. Additions to the plant have made the increased output possible.

The new order comes through Gaston, Williams & Wigmore, Inc. If necessary the Long Island plant can be diverted from present work to fulfill the order.

BRITISH MOTOR TRUST

NEW YORK CITY, Oct. 12—According to reports from England, several big munitions concerns there formerly engaged in motor vehicle manufacture are contemplating pooling their capital to an amount aggregating £30,000,000—$145,000,000—combining to produce low-priced vehicles in quantity.

LYONS FAIR DESPITE WAR

NEW YORK CITY, Oct. 11—American manufacturers will have an opportunity of exhibiting their wares in southern France at the annual fair at Lyons, which will be held, despite the war, on March 1 to 15, 1917. "Buyers from all over the world," states the Department of Commerce in a bulletin on the subject, "will be present, and it is desired to have as large a representation of American manufacturers as possible. The State Department has placed $500 at the disposal of the American Consul, which will enable him to distribute the catalogs and other literature of American manufacturers who are interested."

Catalogs may be forwarded directly to the U. S. Consul at Lyons and should be printed in French.

LATIN-AMERICAN BUYERS SEEK AMERICAN GOODS HERE

NEW YORK CITY, Oct. 3—Buyers from Cuba, Panama and Venezuela are at present in New York, according to the International Resident Buyers, 33 Union Square, this city, are now seeking lines of American merchandise and machinery to dispose of in their countries on a commission basis. The International Resident Buyers firm has branch offices in the West Indies, Central and South America, Europe, Australia and the Far East.

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Truck Restrictions Pend in New Jersey, New York and Cleveland

Jersey Committee's Proposals Would Virtually Banish Motor Trucks from Roads

NEW YORK CITY, Oct. 13—It will be commercially impossible to operate any kind of motor truck in the State of New Jersey if the recommendations of the special committee appointed by William L. Dill, Commissioner of Motor Vehicles of that State, are enacted into law. These recommendations were aired for the first time at a public hearing held in the court house in Newark, N. J., on Oct., 2, and showed that the committee which formed them has such an utter lack of understanding of the operation of motor trucks as to make it ridiculous.

Among the most glaring of the absurdities with which the committee seeks to burden the motor truck operator is one that each truck driver must carry waybills for each load, these waybills to show the gross weight and net weight carried, another that all commercial vehicles shall carry spare wheels, so as to avoid the possibility of any part of the steel rims coming into contact with the surface of the road should the rubber tires become broken or otherwise damaged.

The utter impossibility of operating a motor truck if the driver must obtain a waybill showing the weight of each load can be realized if one will consider the case of any kind of truck engaged in work in which parts of the load must be picked up at different points and delivered at still other points. Every merchant who wanted to ship a parcel or any kind of goods would have to install scales to comply with the proposed measure. Even if this were done, at a tremendous expense, the waybills would be of no value as soon as the truck delivered a portion of its load at its first stop. The driver would have to be a skilled mathematician to calculate the weights of the goods delivered at the various points, subtracting those from the total load at the start and then adding to what was left the weight of the goods picked up *en route*. The commissioners would have the drivers spending most of their time figuring weights, with very little left for the actual running of the truck, which, after all, is the only way it can make any money for its owner. Consider what a tremendous expense to which all merchants would be put to in first of all preparing to weigh all their goods and then paying men to do the actual weighing. Even if this could be accomplished, the waybills so obtained would be of no value. because at the first stop at which a truck delivered a portion of its load they would not show the net weight carried without considerable calculation.

In regard to the recommendation that each truck carry a spare wheel to be applied to the truck on the road in case any of the rubber tires became broken or otherwise damaged, it would be highly amusing indeed to have the committee state how the driver of a 5-ton truck and his helper could replace one of the vehicle's rear wheels, weighing about 800 lb. apiece, on the road without the aid of some sort of derrick or crane.

Nor were the two recommendations already mentioned the only ones which the committee, which is formed of engineers of several of the counties of the State, seeks to impose.

It also would limit the width of any truck over 4000 lb. weight to 96 in., outside measurement. It would provide an exception in extreme cases to privilege an operator to use a truck over 96 in. wide if the weight of the load is not a factor. It is not apparent on the surface what effect the width of the vehicle has on the load of a truck. Nor is it clear why a truck weighing less than 4000 lb. may have a greater width than the maximum provided for a 1½-tonner.

From the question of width and its obscure effect on the load of a truck, as it concerns damage to the road surface, it would appear that the committee has overlooked the fact that truck width has nothing to do with the effect of the vehicle operation on the roads. It is affected by the weight of the truck and its load and its speed and the manner in which the load is supported by the tires and their area in contact with the road.

The weight per square inch which rubber will withstand without breakdown determines the load carried in every case. This pressure which rubber will withstand is the same for small tires as it it with large ones. For heavy loads the tires are made wider, the pressure per square inch on the road, one of the factors upon which road wear is dependent, remaining the same in all cases. Speed and the impact of the wheels on uneven roads is another factor, but as a heavy truck always runs slower than a lighter one, the bigger the truck the better, so long as the maximum pressure per square inch is not exceeded. In fact, slow-moving, heavy trucks have somewhat of a steam-roller effect on the road, whereas the high-speed passenger cars create sufficient road suction as to tend to lift the binder from the top dressing.

While discussing the question of the effect of weight of vehicles on the roads it is well to diverge for a moment to learn the crux of the situation in New Jersey. New Jersey roads are fast deteriorating. They are now known to be some of the worst in the country. It would appear that they were not originally constructed to bear continuous heavy traffic of any kind, be it passenger car, norse wagon or motor truck, or that they have not been properly maintained, or both. Now that tney are wearing out, the taxpayers are endeavoring to raise sufficient money to rebuild them and have picked out the motor truck to pay the bill.

In all the discussion which the committee has had, the motor truck has had to stand the blame. All of the suggested ordinances have applied to the motor truck and the motor truck alone. Nothing has been said about taxing horse wagons or passenger cars. The committee does not seek to have horse wagon drivers carry waybills, nor does it seek to have them apply rubber tires.

Another of the committee's suggested statutes would make it prohibitory for any motor truck to be equipped with any tire covering of metal, or with any lugs or hobs or other sharp devices which would be in contact with the surface of the road, except non-skid chains. Nothing is said about the narrow, knife-like horse wagon tires of steel, and how they cut into the soft road surface on hot days.

Another suggested restriction is that the extreme length of motor trucks shall not exceed 23 ft. 6 in. In many instances the extreme length of a horse wagon from the tip of the horses' noses to the rear edge of the tailgate is in excess of the limit which it is sought to place on the truck.

Still another suggested restriction is that not more than one trailer shall be allowed to any commercial vehicle and that in every case the trailer shall be equipped with rubber tires. In the case of semi- or two-wheeled trailers, these are many times horse wagons with the front wheels removed, in some cases hauled alternately by tractors and teams. They carry no greater load when hauled bp a tractor than by horses, so why should they be shod with rubber tires in one case while steel tires suffice in the other?

All of these measures seemed to be aimed directly at the motor truck and the motor truck alone. It is discriminatory legislation.

Nor is this all, for the committee seeks to increase the truck registration fees from the present maximum of $25 to a new high mark of $125.

Fortunately, there is still time for motor truck owners and operators in New Jersey to protest vigorously against the proposed new ordinances, for the meeting held on Oct. 2 broke up without accomplishing any concrete results except to make known to the committee the absurdity of some of its recommendations. The meeting was attended by about 125 truck owners and dealers and representatives of the truck manufacturers. Both

MAXIMUM TIRE LOADS, IN POUNDS, AS SUGGESTED BY NEW JERSEY COMMISSIONER OF MOTOR VEHICLES

Size		Wheel Diameters, Inches 32	34	36	38	40	42	Speed, Miles Per Hour
2"	Single	565	595	625	660	690	720	20
2½"	Single	840	890	940	990	1,040	1,090	20
3"	Single	1,125	1,190	1,250	1,315	1,375	1,440	20
3½"	Single	1,415	1,490	1,565	1,640	1,715	1,790	18
4"	Single	1,690	1,780	1,875	1,970	2,065	2,155	16
5"	Single	2,250	2,375	2,500	2,625	2,750	2,875	14
6"	Single	2,815	2,970	3,125	3,285	3,440	3,595	12
7"	Single	3,375	3,565	3,750	3,940	4,125	4,315	10
2"	Double	1,125	1,188	1,250	1,312	1,375	1,438	18
2½"	Double	1,675	1,775	1,875	1,975	2,075	2,175	18
3"	Double	2,250	2,375	2,500	2,625	2,750	2,875	16
3½"	Double	2,825	2,975	3,125	3,275	3,425	3,575	14
4"	Double	3,375	3,560	3,750	3,940	4,125	4,310	13
5"	Double	4,500	4,750	5,000	5,250	5,500	5,750	12
6"	Double	5,625	5,940	6,250	6,565	6,875	7,190	10
7"	Double	6,750	7,125	7,500	7,875	8,250	8,625	10

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the Motor Truck Club of New Jersey and the Motor Truck Club of America were represented at the meeting by their counsels, the former by Judge W. Eugene Turton and the latter by Charles G. Bond, of the firm of Coulter & Bond.

The recommendations of the committee, which consists of John J. Albertson, Garwood Ferguson, Alvin Fox, Thomas J. Wasser, chairman, and Frederic A. Reimer, secretary, are as follows:

"1—No commercial vehicle or truck of over 4,000 pounds weight shall be more than 96 inches in width, outside measurements, except that in extreme cases the Commissioner of Motor Vehicles shall be privileged to issue permits for the operation of motor vehicles or trucks with a width of load over 96 inches where the weight of the load is not a factor.

"2—That no commercial vehicle or truck shall be equipped with metal tires that may be in contact with the surface of the road, nor shall any such vehicle or truck be equipped with any tires which have a partial contact of the metal with the surface of the road.

"3—That no commercial vehicle or truck shall be equipped with any tire covering of metal, or with any lugs or hobs, or other sharp devices which would be in contact with the surface of the road, except chains which may be used in accordance with the motor vehicle act.

"4—That the height of all commercial vehicles or trucks be limited to 12 feet 2 inches.

"5—That all commercial vehicles or trucks should be equipped with sealed governors, the speed to be regulated as per schedule attached hereto.

"6—That no commercial vehicle or truck shall be equipped with a center searchlight, but that the lights of all commercial vehicles or trucks shall be in conformity with Section IV of the Motor Vehicle Act.

"7—That the extreme length of motor vehicles or trucks shall not exceed 23 feet 6 inches.

"8—That not more than one trailer shall be allowed to any commercial vehicle or truck; that in every case said trailer shall be equipped with rubber tires.

"9—That all commercial vehicles or trucks shall carry spare wheels, so as to avoid the possibility of any part of the steel rims coming into contact with the surface of the road, should the rubber tires become broken or otherwise damaged.

"10—That all drivers of commercial vehicles or trucks shall carry way bills for each load, said way bills to show the gross weight and net weight carried.

"11—That the commercial size of tires used on all commercial vehicles or trucks shall be determined on the maximum width of rubber.

"12—That all license fees shall be based on the maximum wheel load carried on same, said wheel load to be determined by the size of tire used and adopted in conformity with the schedule shown on the opposite page.

"13—That all trailers or semi-trailers shall be licensed on their carrying capacity.

"14—That all counties in the state shall place signs showing the clearance on all bridges in their respective counties, if the clear headroom is less than 12 feet 6 inches.

"15—That a special permit be secured from the state motor vehicle commissioner for the use of trucks as pleasure vehicles.

"16—Trucks or commercial vehicles equipped with under-sized tires shall not be licensed.

"17—That one-third of the gross weight of truck and carrying capacity combined must be within the limits of the schedule of the respective diameter of rear wheel, size of tire and speed in miles per hour as shown in the schedule shown on the opposite page.

"18—That the front axle shall carry the balance of the gross weight of truck and load combined and must be within the limits of the schedule of the respective diameter of wheel, size of tire and speed in miles per hour for single tires, as shown by schedule hereto attached.

"19—That all commercial vehicles or trucks carrying any load extending beyond the sides or ends of the outside dimensions of said vehicles or trucks, shall have displayed at the outside extremity of load a red flag which shall be not less than 12 inches square and shall be so hung as to present a full view to approaching vehicles."

SCHEDULE SHOWING ANNUAL FEE AND FEE IN SEPTEMBER, BASED ON GROSS WEIGHT

Gross weight of truck and carrying capacity Pounds			Annual Fee	Fee in September
4,000 or less			$15.00	$7.50
4,000	TO	5,000	17.50	8.75
5,000		6,000	20.00	10.00
6,000		7,000	22.50	11.25
7,000		8,000	25.00	12.50
8,000		9,000	27.50	13.75
9,000		10,000	30.00	15.00
10,000		11,000	32.50	16.25
11,000		12,000	35.00	17.50
12,000		13,000	40.00	20.00
13,000		14,000	45.00	22.50
14,000		15,000	50.00	25.00
15,000		16,000	55.00	27.50
16,000		17,000	60.00	30.00
17,000		18,000	65.00	32.50
18,000		19,000	70.00	35.00
19,000		20,000	75.00	37.50
20,000		21,000	81.25	40.63
21,000		22,000	87.50	43.75
22,000		23,000	93.75	46.88
23,000		24,000	100.00	50.00
24,000		25,000	106.25	53.13
25,000		26,000	112.50	56.25
26,000		27,000	118.75	59.38
27,000			125.00	62.50

Truck Club to Confer on Restrictions

Prominent Experts to Discuss Proposed Limitations with Owner Members of Body

NEW YORK CITY, Oct. 13—"Pending Legislation Affecting the Use of Highways by Motor Trucks," will be the subject of the first meeting of the fall season of the Motor Truck Club of America, to be held at the Automobile Club of America, 247 West Fifty-fourth Street, on Wednesday evening, Oct. 18, at 8.30 p. m.

It is hoped that a large attendance of owners and operators will attend in order that suitable steps may be discussed and then taken to fight the proposed discriminatory legislation as outlined by the motor vehicle commissioner of New Jersey as given on the opposite page. It will be remembered that New York State also has a similar commission, and although the latter has not yet called any public hearing, it is liable to be affected by the outcome of the suggested restrictions in the sister State across the Hudson. Mr. Stern, Engineer of the Bureau of Highways, Borough of Manhattan, will address the gathering, speaking of the manner in which heavy motor vehicles have affected pavements in New York City. His talk will be illustrated by more than a score of lantern slides.

CLEVELAND WHEEL TAX DROPPED

CLEVELAND, OHIO, Oct. 13—Cleveland's wheel tax of $2 per wheel and an additional fee for motor trucks of $1 per ton for all trucks over 1-ton capacity, has been tabled. Its enactment into law is not a probability of the immediate future.

CLEVELAND PLANS RESTRICTION OF TRAILER USE

CLEVELAND, OHIO, Oct. 13—The use of more than two trailers per motor truck will be prohibited in Cleveland, if a proposed new traffic law as discussed in the common council on Oct. 9, is enacted into law. In addition, the use of one or two trailers in connection with a motor truck will require that an extra man accompany the driver when such trailers are being used, provided the trailers are loaded with more than 500 lb.

The proposed measure further provides that when a hill of more than 5 per cent is being ascended, the extra man must be on the rear trailer. The latter must also be equipped with suitable brakes or safety chains.

The most objectionable feature of the proposed ordinance is perhaps that which would seek to forbid the use of the streets to any trailer with steel tires whose total weight, including its load, is in excess of 750 lb. If this recommendation is made into law it will cause practically every semi-trailer in the city to be laid up.

GOTHAM-JERSEY TRUCK LINE

NEW YORK CITY, Sept. 30—The New York and New Jersey Express Co. has been organized to do a general haulage business by motor trucks between this city and New Jersey points within a radius of 20 miles. The project is the outgrowth of the great increase of manufacturing in nearby cities, including Newark and Elizabeth, whose outlet for export has been limited by railroad congestion. The company plans to put into operation 104 heavy trucks, contracts having been signed for hauling 55,000 tons of goods per month.

The company has $2,000,000 7 per cent preferred stock fully paid up and 10,000 shares of common without par value. The company's offices are at 309 Broadway.

CAR STRIKE BEGETS NEW TRAFFIC RULES

NEW YORK CITY, Sept. 30—Isles of safety are now put at the intersections of Fifth Avenue with Forty-third, Forty-sixth and each alternate cross street as far north as Fifty-ninth to help solve the night traffic problem due to the increased vehicle travel caused by the street-car strike. These isles of safety render it possible to withdraw traffic policemen from these points for other duties.

ADVISORY DEFENSE COMMISSION NAMED

NEW YORK CITY, Oct. 12—President Wilson has named seven members of the Advisory Commission, associated with the Council of National Defense, to study and suggest methods of increasing industrial and military efficiency of transportation and manufacture of munitions of war. The motor vehicle industry is represented by Howard E. Coffin, other members being Daniel Willard, president of the B. & O.; Samuel Gompers, president of the American Federation of Labor; Dr. Franklin H. Martin, Bernard Baruch, Dr. Hollis Godfrey and Julius Rosenwald.

The duties of the commission will be:

"1. The co-ordination of all forms of transportation and the development of means of transportation to meet the military, industrial and commercial needs of the nation.

"2. The extension of the industrial mobilization work of the Committee on Industrial Preparedness of the Naval Consulting Board."

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A Square Deal

Basis of Successful

Bonus System for Drivers



A successful bonus system is like a game of cards. Each driver must get a square deal

BONUS systems for motor-truck drivers must insure each man getting a square deal if the systems are to prove successful. Such systems, no matter on what basis they are calculated, are founded primarily on the element of human nature, in that they seek to increase the efficiency of the vehicles through the medium of the driver. His attitude toward the system is, therefore, of the utmost importance, for if he feels that he has not the same opportunity for sharing in the rewards given for conscientious work performed he will naturally cease in his endeavors to make a better showing for his truck. This will defeat the purpose of the system.

Consider the drivers as playing in a game of cards in which the man in charge of the trucks is dealing. If one of the men notices that the dealer is handing one of the other players an ace picked from his lap or dropped out of his sleeve, that player will drop out of the game, or break it up entirely, because he knows that he has not the same chance to win as the others. Now, consider that the card game is not poker or pinochle, but the game of a bonus system, in which the cards dealt represent the factors of mileage, tonnage, repairs, punctuality and any other items from which the bonus awards are determined. If each driver does not get a square deal in the shuffle of the various factors, he will drop out of the bonus game, because he realizes that he has not a fair chance to win, and thus the value of the system will be *nil.*



Give me a re-made tire. I think I can reduce my tire expense by using remade instead of new tires and thus better my chances for the bonus award

Efficiency Bonus System Aim

There seems to be a great deal of uncertainty as to the best method to pursue in the determination of the basis on which to calculate the bonus and the best manner in which to put the system in actual operation after it has been decided upon. It is the purpose of this short article to point out the prime requisites of any bonus system for motor-truck drivers and to give the reasons why some systems have failed and others proved highly successful.

The primary aim of every bonus system is to increase the efficiency of the truck to the highest possible point considering the actual service conditions beyond the control of the owner under which it is forced to operate. A bonus system should enable the truck to do more work in the same time by eliminating delays under the control of the driver, such as loading at the place of business of the owner, loafing on the routes, or undue periods of time spent at the points of the delivery of the goods. These three items alone are liable to represent a large proportion of the actual working time of the truck each day, and anything which can be done to reduce that time means just so much more time that can be put to advantage in the delivery of additional goods.

Where the physical conditions under which a truck operates cause delays beyond the control of the driver, such as ferriage holdups, and time lost in making deliveries to congested and poorly arranged docks and wharves, the effect of the bonus system is not liable to be as efficacious as it should be, although in some instances good results have been obtained.

Bonuses are sometimes offered drivers according to the condition of their vehicles; the amount of repairs that have to be made to them in any given period of time; the neatness of the truck and of the driver himself, and the class of service rendered by the latter, as evidenced by the number of complaints received against him. Bonuses are also given for the punctuality and regularity of drivers in certain classes of work where the lateness of a driver in reporting for work in the morning, or his absence on a regular working day, is liable to upset the entire delivery schedule. Bonuses are also offered in some classes of work for the careful handling of goods liable to breakage.

System Basis Requires Much Study

From all these items, which might rightfully enter into a comprehensive bonus system, including those for the amount of goods delivered, the manner in which it is delivered, the conduct of the driver, and the cost of maintenance and repairs to the truck it is seen that a system which will be equitable to all the drivers concerned requires a great amount of study and experimentation.

Bonus systems which are to work or actually accomplish the purpose for which they are designed cannot be formulated in a moment's time. They require, first of all, a thorough knowledge of the conditions under which the trucks of a fleet must work. A bonus system which proves equitable for the drivers of a fleet of 1-ton trucks, say in delivering packages in department-store service, could not be made applicable, without considerable changes, to the drivers of a fleet of 3-ton trucks in the service of the same company which delivered nothing but furniture, although it was delivered over approximately the same territory as that in which the packages were carried.

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Nor can a bonus system be fairly applied to a crew of drivers of a fleet of trucks of different makes and construction, even though of the same capacity, and operating over the same territory. This is self-evident from the fact that one make of truck might have been found to give a great amount of mechanical trouble, not due in any way to the handling by drivers, while the other make of vehicle developed little, if any, trouble.

Truck Age Must Be Considered

Another item which has to be taken into consideration is the age of the trucks themselves. For instance, it would not be fair to assume that a truck which was 10 years old would not need more replacements and repairs than a truck less than 1 year old; or that, due to the time consumed in making such repairs, the latter truck should not be expected to deliver more goods in any specified period of time.

These necessary conditions must be taken into account in the development of any fair bonus system which is to be based upon the amount of goods delivered per day, or the cost of maintenance of the vehicle; and it is evident that such a system can only be applied to vehicles of unlike make, age, and capacity, working in different circumstances, when proper allowances are made for these variables. If these conditions are not taken into consideration, it may be seen readily that the driver of a new truck working in a territory where the roads are good would have an unfair advantage over the driver of an older truck working in territory where the roads are not so good, and where the actual delivery of the goods carried might consume more time due to the physical characteristics of the area served.

System Must Give Equal Chances

Of course, this does not mean that bonus systems cannot be devised for all sorts of work under varying conditions, but simply that each system must be founded on a basis which will insure each driver the same opportunity. This is very important, for any bonus system which does not give each driver an equal chance will soon defeat its purpose, for those drivers who feel that they are not receiving an equal opportunity to share in the rewards for meritorious work performed will soon stop trying to increase the efficiency of their vehicles.

Bonus systems are most effectively applied to those drivers of trucks who do the same kind of work day in and day out, or at least over moderately long periods. The reason for this is that a bonus system applicable, say, to the hauling of sand between two given points would not be fair if the trucks were set to work hauling steel or other material, due to the class of material and the time taken to load and unload. A separate basis would have to be worked out for each of these cases, and if the trucks were put to hauling still another class of goods, under different conditions, a third basis for a system would have to be worked out, with the result that the cost of calculating the various basic units for each system would probably offset any saving effected during the short periods of their operation.

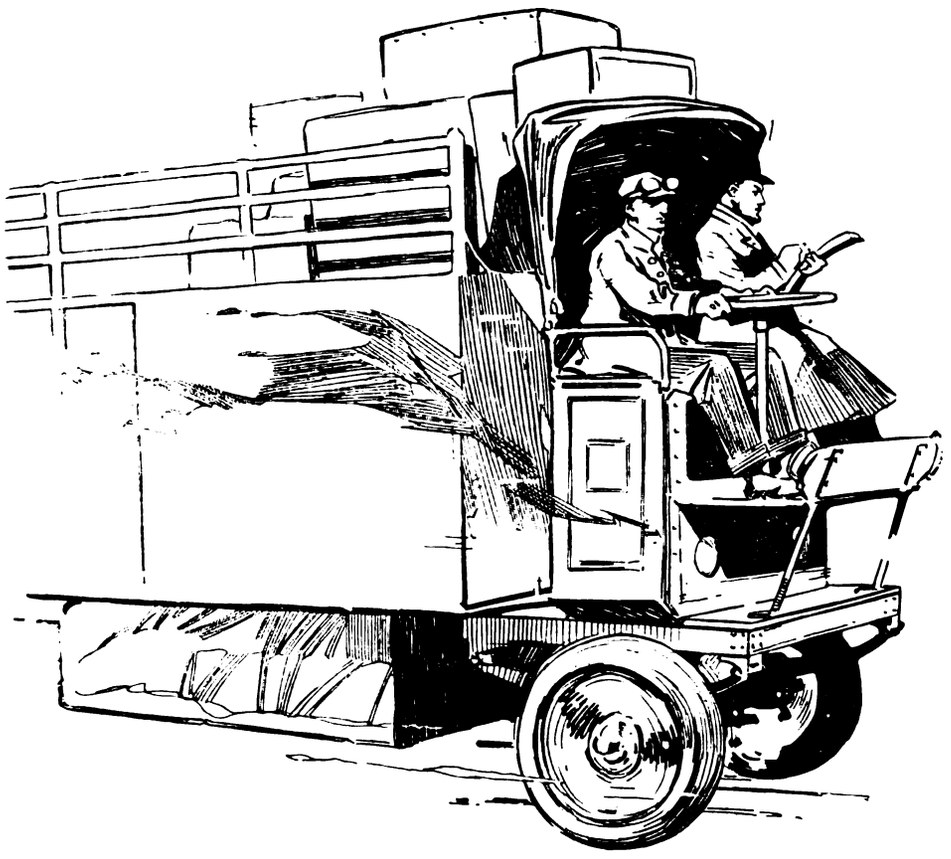


Be careful of that vase. If you break it, I'll lose my chance at this month's bonus

Mileage a Big Factor

Still another point which must be taken into consideration in the determination of a system based on the goods delivered is that of mileage traveled in such delivery. For instance, it would not be fair to pay a bonus to the driver of a truck which delivered, say, 10 tons of goods within a 5-mile radius from the plant in a day, and not to one who delivered only 5 tons in the same time, but all of which was delivered beyond, say, the 10 or 15-mile radius. From this it is seen that tonnage alone is not sufficient basis, or mileage alone, but a combination of both—the commercial ton-mile. As explained in THE COMMERCIAL VEHICLE of April 15, 1915, the commercial ton-mileage or package mileage of a truck on any one trip, from the time it leaves the plant or store until it returns, is obtained by the simple multiplication of the number of tons or packages carried on that trip by the mileage covered. Both of these factors are easily obtainable—the mileage from the odometer, and the tonnage by weighing or estimation at the points of loading.

A simple bonus system, employing the commercial ton-mile as a basis, is that put in force with the electric trucks of the Central Stamping Co., Newark, N. J., by Theodore D. Pratt, late works engineer for that concern. That company operates two 5-ton electric trucks between its plant and the docks and wharves along the New York City waterfront. It was intended that these trucks should make two round trips per day, but often the drivers reported that they could not make them because of excessive delays in waiting to get on the piers.



Pratt rode on his trucks now and then to find out exactly where the delays occurred

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Mr. Pratt rode on the trucks now and then, for several weeks, and found that the trucks were often delayed as the drivers reported. However, he was of the opinion that the drivers could make the two trips every day without much trouble, provided they used good judgment. Accordingly, the average tonnage and mileage of these two trucks were calculated, and it was decided to pay each driver $3 per day for 75 ton-miles of work, and 4c. additional for each ton-mile above that total. That system has resulted in the drivers being able to make two trips per day regularly. The drivers earn from $4 to $5 per day, depending upon the work which they do, and in exact proportion to the amount done. That bonus system has been considered very successful by the Central Stamping company, which has found that it has had no ill effects on the trucks.

Many of those who are not in favor of truck-driver bonuses of any kind use as their argument against them the fact that incompetent or careless drivers are liable to abuse their vehicles to such an extent to gain the desired bonuses that the cost of repairs more than offsets the value of the additional work performed.

Trucks Require Daily Inspection

While this has been the case in many instances, the fault was not so much in the bonus system as it was in the manner in which the trucks were inspected daily. Motor trucks, like all other forms of machinery, should be carefully inspected daily, and if this is properly done it will not take the man in charge of the trucks long to determine if the vehicles are being abused. A driver who is found to be abusing his truck by overloading or overspeeding it, or in any other manner, in order to earn a bonus, should be discharged at once.

Another bonus system now in use, and giving most satisfactory results is that employed by L. Bamberger & Co., owning a large department store in Newark, N. J. That concern uses three makes of trucks: electrics for city work, 800-pound converted passenger cars for parcel work within a 10-mile radius from the store, and 2-ton trucks for package and furniture deliveries beyond the 10-mile circle. By this distribution of vehicles it was found that the average daily mileage remained almost constant from month to month, so that the mileage factor was eliminated in arriving at the basis of the system.

Three separate prizes are offered, one for each class of vehicle. The bonus in each case is awarded to those trucks showing the lowest cost of maintenance based on labor, material, tires, and cost of repairs due to accidents. These bonuses are awarded twice a year, on June 1 and Jan. 1. The first prize for the electrics is $15, the first prize for converted passenger cars, Fords, is $20, and the second price, $10. Two prizes are also offered in the 2-ton-truck class, the first being $25, and the second $15.



I must not be late this morning, or else my bonus chances will be gone

Realizing that the cost of maintenance upon which the system is based would naturally vary according to the age of the vehicles, this important consideration was taken into account by means of arbitrarily selected percentage points. These vary for labor and material only, and not tires and accidents, which should not wear more, or occur more often, no matter how old the vehicle. The percentage points are credited as follows:

	Vehicles Less Than 6 Months Old	Vehicles from 6 Months to 1 Year Old	Vehicles from 1 to 1½ Years Old	Vehicles from 1½ to 2 Years Old*
Labor	30 points	25 points	22½ points	20 points
Material	30 points	25 points	22½ points	20 points
Tires	25 points	25 points	25 points	25 points
Accidents	15 points	15 points	15 points	15 points
Total	100 points	90 points	85 points	80 points

*For vehicles more than 2 years old, the percentage points charged to labor and material are reduced 1 per cent for every 6 months during the life of the vehicle.

Thus, if the labor and material for a truck less than 6 months old amounts to, say, $100, then $30, or 30 per cent, will be used in calculating the cost to determine the bonus winner. The other items for material, tires, and accidents are calculated in a similar manner.

Take, for example, the cases of two trucks: 1, less than 6 months old, and truck 2, between 1½ and 2 years old, as follows:

	Truck 1	Truck 2
Labor	$100 × 30% = $30.00	$175 × 20% = $35.00
Tires	50 × 30% = 15.00	90 × 20% = 18.00
Material	150 × 25% = 37.50	175 × 25% = 43.75
Accidents	25 × 15% = 3.75	None ....
Total system cost	$86.25	$96.75

From the above figures, it is seen that the newer truck has a higher rating in the compilation of the bonus award than the older vehicle, the comparative ratio being as $86.25 is to $96.75, or as 1 is to 1.12, although the actual maintenance charges are as $325 is to $440, or as 1 is to 1.35, the difference between the two ratios being due to the difference in the ages of the trucks.

System Reduces Upkeep Charges

The determination of the Bamberger system was simplified by the fact that the mileage of the vehicles in each of the three classes was the same. It is also to be noted that the system does not take into account any efficiency in the delivery of the goods, but is in reality one to reduce the maintenance charges. In that respect the system has proved very satisfactory in that it has reduced greatly the cost of tire replacements, the cost of repair work, and the number of accidents. In their endeavor to win the bonuses, some of the drivers have made requests for re-made instead of new tires, in order to try to cut down the tire cost.

Due to the fluctuations in the business done in the different sections in which the Bamberger patrons live according to the different seasons of the year, it was decided not to complicate the system by introducing any package or tonnage factors, the common mileage factor rendering each class of vehicles on a par on that score. Of course, the package or tonnage factors could have been introduced by multiplying the resultant maintenance-

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cost factors by the number of packages or tons carried during the 6-month period, but this was not considered necessary, in view of the fact that the original purpose of the system was to get the drivers to consider their trucks as their own, and in this way cause them to give the vehicles the best possible care.

Bamberger Gives Additional Prizes

In addition to the bonuses offered by the Bamberger company for maintenance, as outlined above, it also awards five other prizes of $20, $15, $10, $5, and $2.50, three times a year. These bonuses are awarded to those drivers who excel in the following particulars: Minimum number of days absent; minimum amount of broken merchandise; minimum amount of lost merchandise; minimum number of complaints received, and neatness in personal appearance.

Gimbel's Drivers Pick Winners

Gimbel Bros. also have a unique bonus system for the drivers of their 113 motor trucks used at their New York City store, the system differing from others of its kind in that the prizes are awarded by a committee of five men selected from among the ranks of the drivers by the drivers and helpers themselves. The purpose of the selection of the committee of five drivers to pass upon the awards is to create the feeling among them that the system is theirs, and that due to the large size of the committee no partiality of any kind can be shown—that a square deal is insured. The formation of such a committee has had the desired effect, the system having been in use since August, 1911, and during that time having produced highly-successful results, both as to the general condition of the trucks and as to the behavior and appearance of the drivers and their helpers.

Drivers' Deportment Important

Like the additional awards of the Bamberger company, the Gimbel bonus system is designed primarily to increase the efficiency of the corps of drivers and helpers, although the efficiency of the trucks enters into the determination of the awards because the amounts of gasoline or current consumed and the number of accidents or breakdowns are considered. The fact that preference is given the efficiency of the crews over that of the trucks, although both are closely corelated, is due to the realization of the fact that the helper or the driver is the last person with whom the purchaser comes into contact and that the impression that these men make sometimes determines whether the customer does her next shopping at the same store or not. For this reason it is highly important that the drivers and helpers at all times act in a gentlemanly manner, are courteous and present an immaculate appearance.

Accordingly general deportment, personal appearance and the number of complaints received are important items in the determination of the bonus winners. Two sets of prizes are awarded, one each month and another every 3 months. The monthly prizes total $67, divided into ten awards as follows: First, $20; second, $10; third, $8; fourth, $7; fifth, $6 sixth, $5; seventh, $4; eighth, $3; ninth, $2, and tenth, $2. The additional awards every 3 months include a first prize of $50; a second of $30 and a third of $20.

Drivers and Helpers Share Prizes

Besides the items of deportment, number of complaints and personal appearance, the following particulars are also considered: Percentage of C.O.D. packages delivered; total number of packages delivered; number of packages returned and the condition of same; merchandise damaged; condition of the truck; number of accidents or breakdowns, amount of gasoline or current consumed; absent without leave; number of times late; trips missed and the number of extra loads taken out. In the awards of the prizes, the drivers get two-thirds and the helpers one-third.

How to Determine System Basis

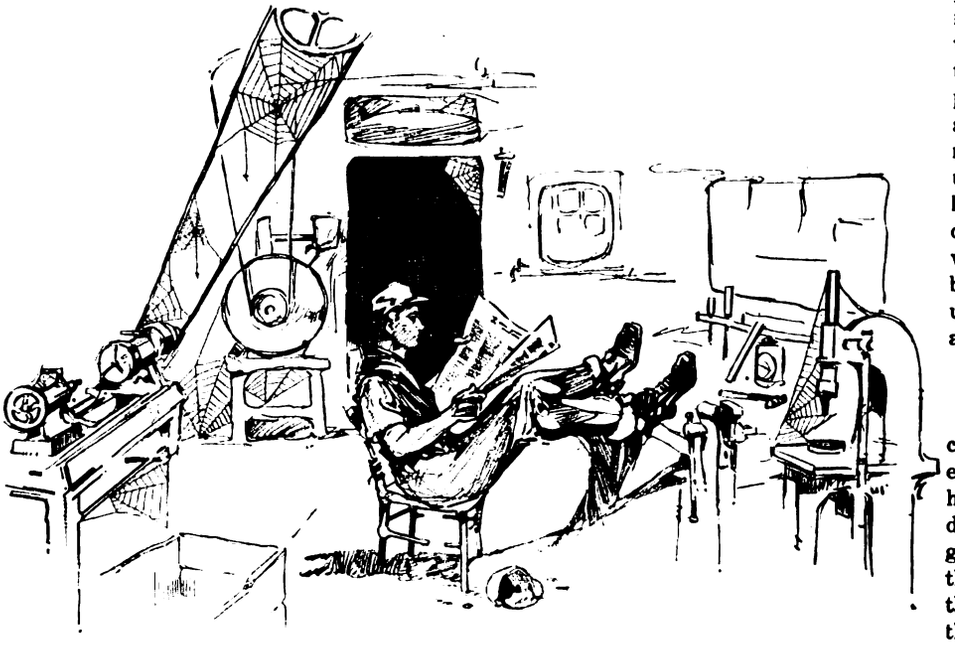
From the three foregoing systems it is evident that a truck user desirous of introducing a bonus system for his drivers should, first of all, make a complete study of the conditions under which his equipment has to operate. If the system is to be based on cost of maintenance, he should, first of all, find the average cost of maintenance for each class and make of vehicle in each particular kind of work, in order to be able to determine what should be a fair charge for maintenance cost in each case. The varying ages of the vehicles should also be taken into account, perhaps in a manner similar to that used by the Bamberger company.

Package-mile a Proper Unit

If the system is to be based on the tonnage or packages delivered and the mileage covered, the owner should make a time study of the trucks in each class over an extended period. He should determine the average actual running time and the standing time. This will enable him to determine just where the delays are occurring and where to endeavor to better conditions, either by the introduction of more efficient facilities or by bonuses to the drivers, or both. The average mileage covered and the tonnage or packages delivered should also be determined, and the basis for any bonus contemplated should be a unit which will take into account both the tonnage or packages delivered and the mileage, such as the commercial ton-mile or package-mile. After a system based on these units is introduced, strict watch should be kept to eliminate the possibility of the drivers abusing their trucks in order to win a bonus, or the system should combine both the ton-mile or package-mile unit and the cost of repair and maintenance units.

Fair Chance Insures Success

If these conditions are taken into account, and separate basic units used for each class of work and each class of vehicle, a bonus system which offers each driver the same chance should prove of great value, provided the work done by the trucks remains fairly constant throughout the year, and does not require the compilation of additional system units to meet different conditions of work.



Repairs on the trucks have decreased considerably since the boss put that bonus system in operation. I guess the drivers are taking better care of their vehicles

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A Latil four-wheel-driven French Army artillery tractor ascending a steep grade in open country

War Proves the Utility of Motor Steeds

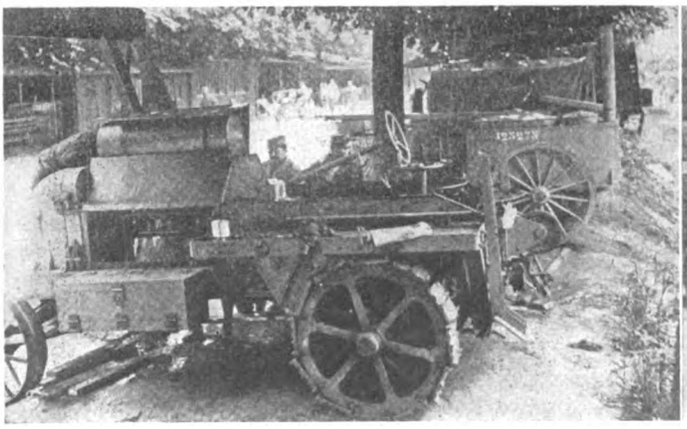


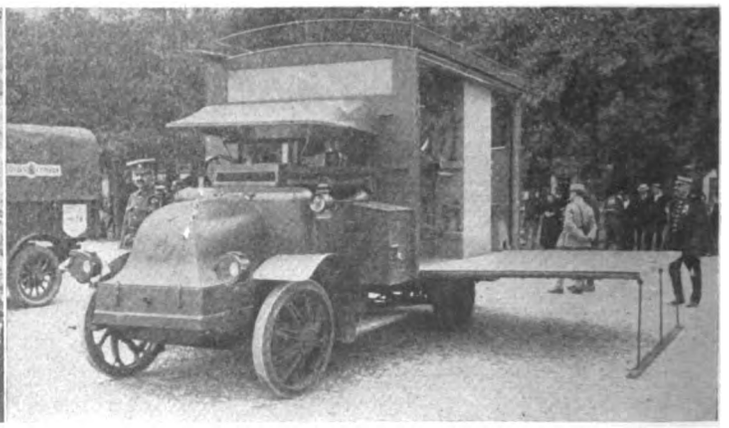
A Renault tractor emerging from a deep valley with its gun in tow, the latter to be later set up in a well-concealed position

MOTORS have opened a new era in the haulage of artillery. Previous to the present war the only tested means of heavy gun transport was by horse traction. Now the French army is using a large number of special four-wheel-driven tractors for this work. They have proven that there are no positions accessible to horse teams which cannot be reached by mechanical means. The general type of these tractors and the work they are required to do are shown in the illustrations at the top and center of this page. Neither roads nor roadless country have terrors for these tractors, which are called upon to penetrate dense forests to set up the guns in concealed positions. The view at the left bottom depicts another type of tractor, and that at the right a British workshop truck attached to an ambulance convoy.



Another view of the Renault creeping up out of the valley. Note the densely wooded country and the front wheel non-skid chains





At the left, an unusual type of Italian tractor now used by the French Army in artillery haulage. Note the distinctive paddle-like tread on the rear wheel. Right, an Austin repairshop truck attached to an ambulance convoy presented to the French by Lloyds of England

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Kulp's Trucks Business-getters Through Quick and Reliable Service Rendered

Buffalo, N. Y., Concern's Profits Increased 30 to 35 Per Cent By Five Trucks Which Replace No Horses—Haul Damaged Passenger Cars as Side Line

QUICK SERVICE rendered by motor trucks has enabled the J. F. Kulp & Sons Co., Buffalo, N. Y., to increase its business from between 30 to 35 per cent. The Kulp company is a large general express and freight forwarding and rigging concern which now operates a fleet of five motor trucks in addition to forty head of horses. Differing from most other installations of both trucks and horses, none of the Kulp horses were disposed of when the motor vehicles were purchased. The work which the trucks have secured is over and above that formerly handled.

In addition, the work secured through the quick service of the trucks in handling freight and express from the various Buffalo freight yards and boat wharves to manufacturing plants outside the city limits has enabled the Kulp company to get other business which can be and is handled more efficiently by its horses because of delays beyond its control.

How Trucks Save Time

An example of the quick service rendered by the trucks is that of handling freight between the railroad terminals in Buffalo and many of the large manufacturing plants within 5 miles of the city. For instance, goods shipped by rail to a large steel company's plant within that area must go to Buffalo and then be transferred to another railroad car to reach the siding at the plant. That company receives goods shipped on several of the railroads entering Buffalo and the material must be collected from the different terminals and deposited at a common depot before being loaded into the car which is to carry it to the plant.

It takes a day to collect the goods and if it does not arrive before 10 a. m. on any day, it is not shipped until the following night, making 2 days before it gets to the plant. Kulp's trucks, however, collect the goods direct from the various freight houses and then haul it direct to the plant, goods at the houses at 7 a. m. being delivered before noon of the same day.

The quick handling of freight of that concern and others similarly situated resulted in the Kulp company getting contracts for setting up various pieces of machinery at the plants of the same concerns, meaning increased business attributable directly to the trucks. Besides that work, the Kulp company also uses its motor trucks to carry machinery and setting-up tackle from Buffalo to points within a 100-mile radius. Before the trucks were purchased the great majority of this work was done within a 10-mile radius due to the limited day's run of the horses. In cases where hauls longer than 20 to 25 miles had to be made with horse vehicles these had to be put up over night at some point on the route or the material shipped by freight. Both of these methods were quite expensive and also unsatisfactory because of the time lost.



One of the Kulp company's 5-ton Pierce-Arrows used for hauling damaged passenger cars into Buffalo. The quick service rendered by the trucks in this work has enabled the Kulp company to secure a major portion of the business in the Buffalo territory. On an average four disabled cars are handled every day of the year

Trucks Haul Wrecked Cars

Another portion of the Kulp business which has assumed large proportions is the hauling into Buffalo of damaged passenger cars whieh have met with accidents on the roads leading into Buffalo. An average of four damaged cars are now brought into Buffalo garages every day of the week. One or two of the trucks are used for this work exclusively and it has been due to the quick service rendered by these vehicles that the Kulp company has been able to secure the major portion of this kind of work in the Buffalo territory.

In fact the Kulp company's first motor truck was bought for this work and it was the extremely satisfactory service rendered that led it to buy the other vehicles of its present fleet. Originally horses were used for the work which was taken up merely to keep them from being idle during the slack periods of the year. There are a great many passenger car accidents in the territory surrounding Buffalo, due perhaps to reckless driving, but more particularly to the fact, that most of the New York State roads in that part of the country are only 12 ft. wide. Many of the accidents are due to cars trying to pass each other on these narrow roads.

Horses Were Too Slow

The use of horses for this work proved unsatisfactory for the reason that the Kulp company had to accept all calls to bring in cars in order to keep its reputation and what business it already had, no matter what time of day or night the call was received or how far from Buffalo the accident occurred. The call which made the Kulp company decide to buy a motor truck for the work was received one morning at 1 a. m. A passenger car owned in Buffalo was wrecked 23 miles out of the city. A two-horse wagon and wrecking equipment left for the scene

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at 2 a. m. It encountered heavy grades on the route, which had to be covered to reach the damaged vehicle and this necessitated the hiring of extra teams to help it on the return trip. Even with this help the wagon did not reach Buffalo until 10 p. m. that night and the damaged car was finally delivered at the owner's garage the following morning, 31 hr. after the call had been received.

Horses Exhausted by Run

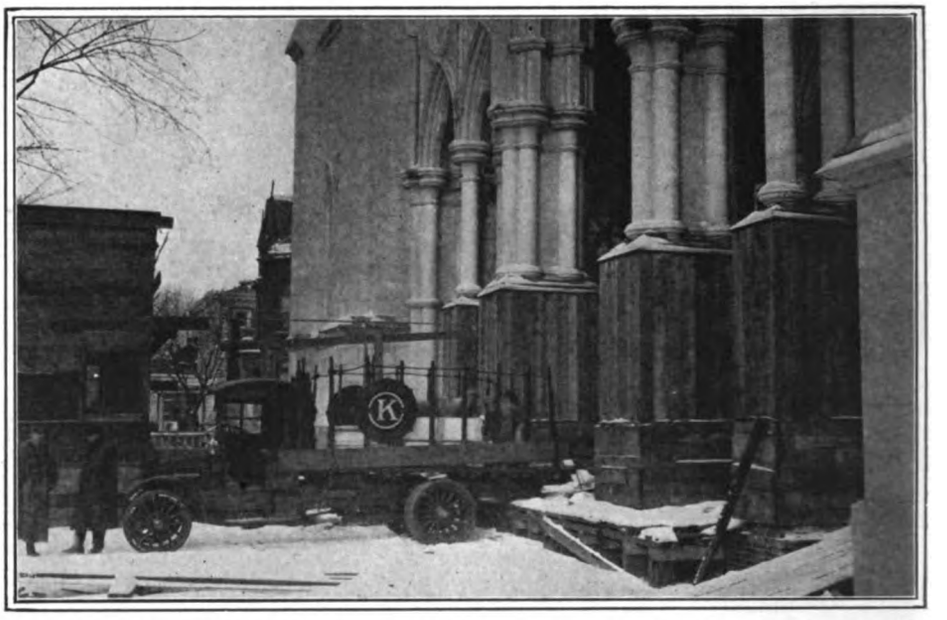
The horses were so exhausted at the end of the trip that they had to be rested for 2 full days before they could do any other work, and this, with the hire of the extra teams on the route caused the Kulp company to lose money on the job. Yet it had to take it, if it wanted to secure the other jobs nearer town which invariably returned profits.

The 3-ton truck which the Kulp company purchased to replace the horses in this business has accomplished in 5 hr. the same work that the two-horse team mentioned above required 31 hr. to do. The quick service rendered by the truck due to its great ground-covering ability has permitted the Kulp company to accept all calls to bring in damaged cars within a 50-mile radius of Buffalo.

The Fleet Make-up

The Kulp company's first truck was a 3-ton American, bought in July, 1911. A 5-ton Pierce-Arrow was purchased in the following month. In April of the following year another Pierce-Arrow of the same capacity was put into service and in August of the same year still another. The next truck bought was a 2-ton Autocar to be used for small jobs which was delivered in January, 1913. In April, 1913, the fourth 5-ton Pierce-Arrow was purchased. The present fleet consists of the four 5-ton Pierce-Arrows and the Autocar, the American 3-tonner having been disposed of.

The majority of the work performed by the trucks is the haulage of freight and express, the rigging and damaged-car business being somewhat of side



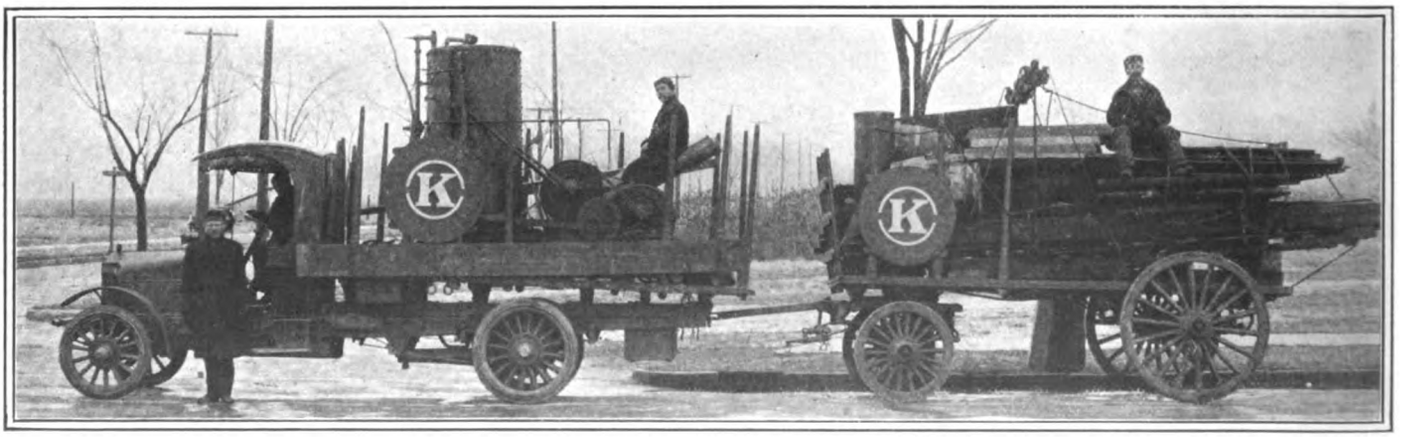
One of the Kulp 5-ton Pierce-Arrows hauling marble for Buffalo's cathedral. Over 590 carloads had to be delivered over an 8-mile round trip route. Great caution had to be observed in handling the brittle material which was loaded into shallow boxes by a crane at the freight yard. At the cathedral, the boxes were easily unloaded by means of wood rollers, thus reducing the idle unloading time. One truck hauled on an average of from 50 to 55 tons per 9-hour working day

issues which enable the vehicles to be kept busy during slack periods. Soon after the first two trucks were put to work in the handling of freight, the Kulp company found that it had to change its entire office system in order to keep them busy at all times of the day. The routes on which the trucks were to be operated had to be selected with especial attention to the delays which might be expected at both the loading and unloading ends. The Kulp horse wagons were sent to the freight houses and wharves where the delays were excessive while the trucks were only sent to those where they were of short duration.

Even under these conditions, the trucks were idle for long periods each day caused by delays at the freight house or wharves or by waits between the completion of one haulage job and the beginning of the next. The actual running time each day could not be determined accurately until it was decided to fit the trucks with tape recording devices manufactured by the American Taximeter Co. These instruments have rendered satisfactory service and have enabled the Kulp company to change its trucks from some routes which at first were thought suitable for their use but which the records proved were highly unsatisfactory because the delays met with and which often aggregated 50 per cent of the possible working day.

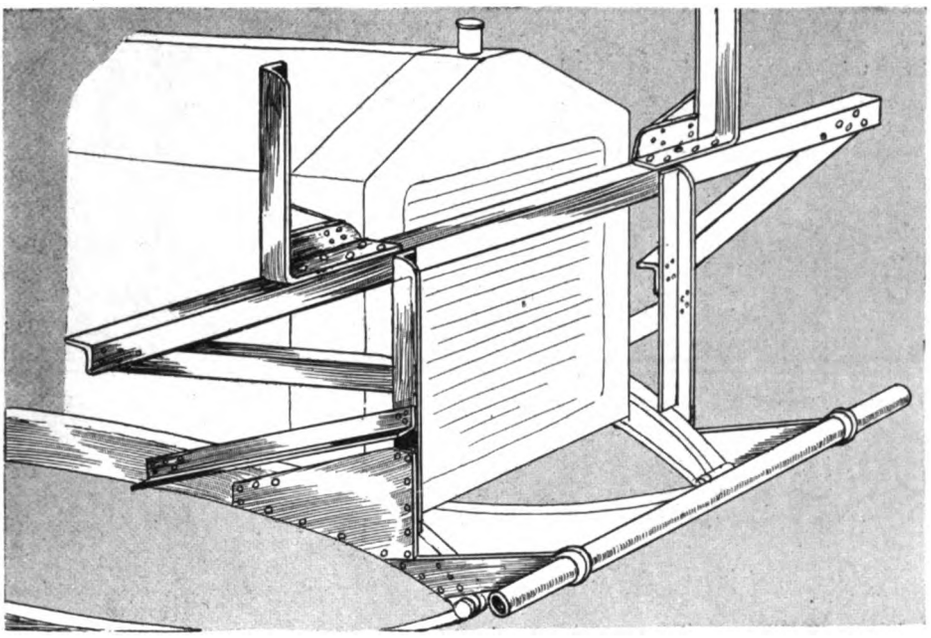
Trucks Dispatched by Woman

After the remaining trucks were purchased the problem of keeping them each busy all day long became more difficult due to the great many jobs handled. Accordingly a passenger car was purchased to be used by one of the company employes who leaves the plant each morning at 7 a. m. and makes a trip to all the freight houses and wharves to col-



Instead of shipping its rigging material by rail to jobs where machinery is to be set up, the Kulp company now uses its trucks, and on some occasions, horse wagons as trailers, as shown above. This method is cheaper and quicker than by rail or by horses, eliminating the delays of loading and unloading at the ends of the journey in the first case and stabling expenses in the second case when the job is more than 20 to 25 miles from the Kulp plant

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Sketch of the special iron framework fitted on the front of the trucks to support the front ends of long planks, derrick masts or booms such as are used in the erection of tanks, smokestacks or large pieces of machinery

lect the bills of lading of material to be delivered by the Kulp concern. He returns to the plant by 9.30 and delivers the bills to the dispatcher of the company, who by the way, is a young woman 24 years old.

Dispatcher an Expert Router

She takes them, sorts them out and then determines from experience how many jobs to give to this truck and how many to that and what ones to give to the horse equipment. This woman dispatcher is the most important employe of the company, for upon her judgment depends whether the trucks make money by being in actual motion for the greatest possible time or lose money by standing idle on routes where the delays are bound to be numerous and of long duration. Of course, the dispatcher has made a study of Buffalo and the surrounding territory and the conditions on the routes over which the trucks must run. She knows these like a book and can tell you just how long it should take a truck to haul so many tons of such material from such a freight house or wharf to any other point. She is thus able to lay out a day's work for each of the trucks which will keep it in actual motion for the greatest possible time.

Recording Tapes Are Checks

She is enabled to check up on her estimates each day by scrutinizing the recording tapes taken from each truck and filed in her office. If she finds that a certain truck took more time on a certain job than she thinks was necessary, it is dependent upon the driver to explain the causes for the delays as indicated on the tape from his truck. By this means she is able to keep in the closest possible touch with actual conditions without leaving her office. It is somewhat strange to have a woman dispatcher giving orders to a crew of motor truck drivers, but E. G. Kulp, junior member of the Kulp company, states that she tends to business better than the former men occupants of the position, and for this reason is a more dependable employe.

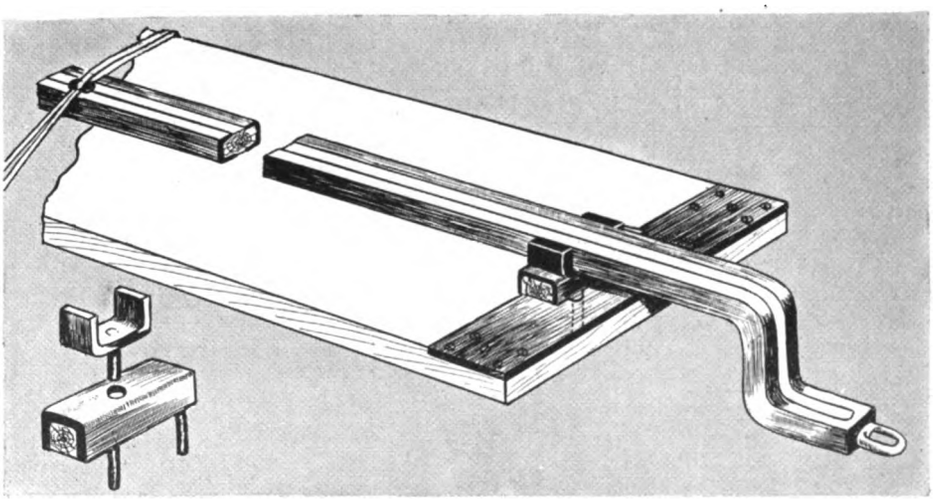
The truck fleet is maintained at the Kulp plant in a modern garage built after the first two trucks were purchased. All minor repairs are made by Kulp employees at the garage while the major repairs are taken care of at the factory of the Pierce-Arrow company, less than 2 miles away. If the Pierce-Arrow company is notified before 5 p. m. of any day, that certain repairs are to be made on one of its trucks, it will arrange to do the work during the night and deliver the truck back to the Kulp garage the following morning before the start of the day's work. In this way the trucks are not taken out of service when they might be doing money-making work.

The employment of the trucks as salvagers of wrecked passenger cars has necessitated the fitting of a winch driven by the truck motor to pull the car aboard the truck when the former is so damaged that it cannot be trailed. When either pair of wheels is intact, the damaged car is usually trailed on the other pair, the damaged end being supported on the end of a long built-up wood and steel bar attached to the floor of the truck body.

Special Towing Bar Used

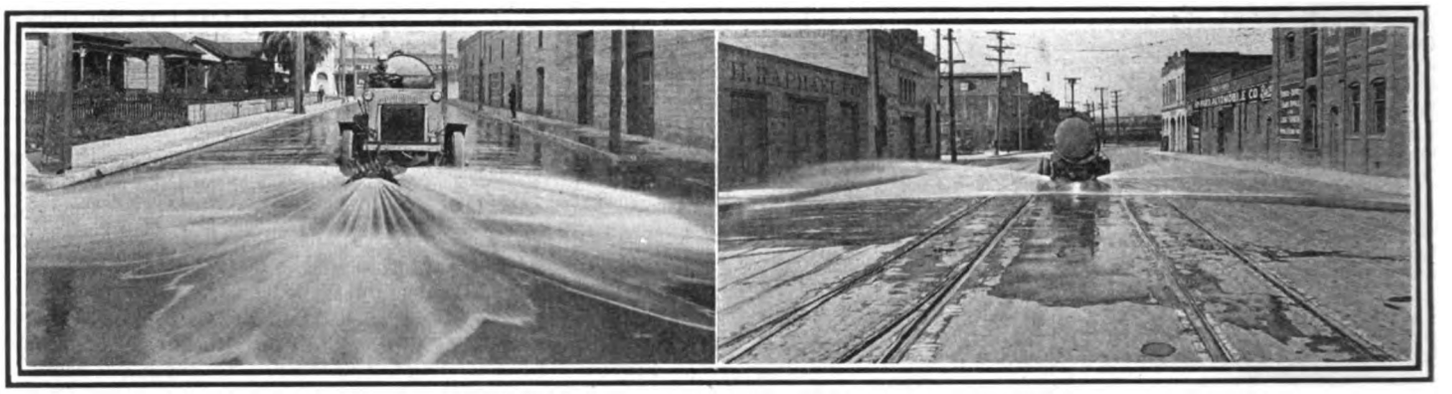
This is shown in the sketch at the bottom of this page and consists of a heavy timber with channels set into each side for strength. It has a bend at the rear end with an eyebolt through which the rope lashings holding the damaged car are run. The bend enables the front end of the damaged car to be carried at a level lower than that of the truck body, although the bar may be turned upside down if necessary. Its forward end is lashed to the truck body by means of ropes extending clear around and under the floor. As shown in the sketch, it is supported at the rear end of the truck on a U-shaped wrought-iron pivot piece with a vertical guide which fits into a hole in a metal-covered block held in place on the truck floor by similar guides. This construction enables the bar to turn about the pivot piece when the truck is turning corners, the forward end of the bar moving to either side by the sliding of the rope lashing under the floor.

The trucks are also equipped with a built-up metal framework attached to the front ends of the frame forward of the radiator to support the front ends of long timbers and rigging or derrick poles. This device is shown in the sketch at the top of this page.



Sketch of the special timber used to carry the front or rear ends of disabled passenger cars. Note the bend at the rear, the channel strengthening and how the front end is lashed by means of ropes to permit of a slight motion when the truck is rounding corners. Note the pivoted guide and supporting block shown at the left

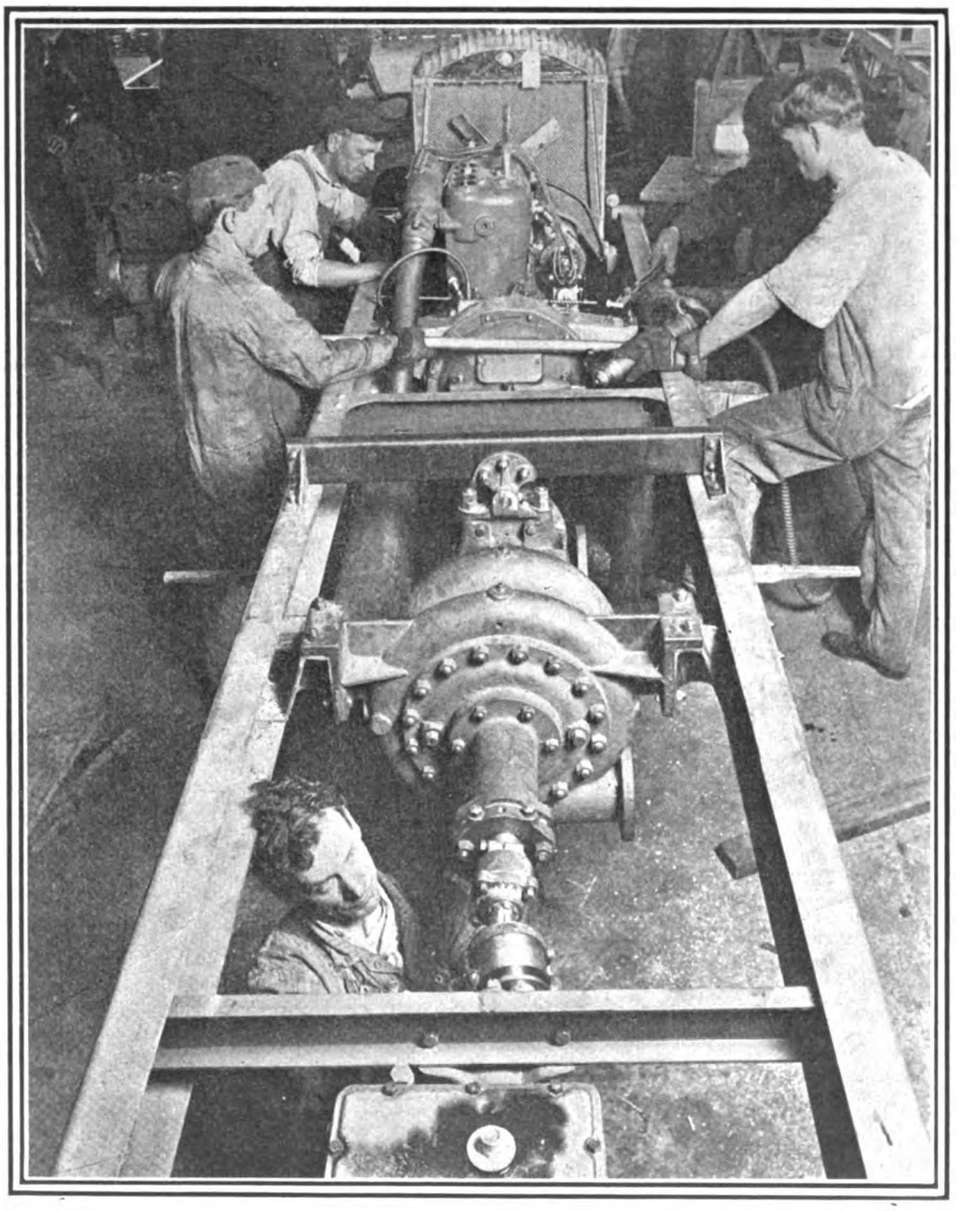
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Moreland street-cleaning truck performing its two operations on 60-foot Los Angeles street. At left, flushing the full width at one passage at 6 miles per hour. At right, sprinkling a 60-foot swath at 8 miles per hour

Motor Flushers Save Los Angeles $150 Daily

Fleet of Five Trucks Equipped With Pressure Pumps and Tanks Oust Horses



Detail view of pressure pump installation on 5-ton Moreland chassis. Pump always turning with driveshaft. By-passing serves to throw it out of action when desired

By John Grant

INVESTIGATION of street cleaning methods was conducted by the City Engineer's office and Street Department of Los Angeles for almost a year before deciding upon the type of equipment to be employed for cleaning the streets. A great variety of methods were tested and among those which had very strong advocates were adherents to the use of horses or mules and animal-drawn sweeping equipment, also motor-driven equipment of the vacuum sweeping type. The efficiency tests of the various classes of equipment put the animal-drawn outfits completely out of consideration, and in the final elimination tests a motor-driven sprinkling and flushing system proved itself superior to the dry-cleaning methods. Investigations not only included tests upon the local streets, but a nation-wide investigation of methods in use in other cities, and consideration was even given to European practice.

The figures to which the engineers finally settled down as a result of all their tests showed a remarkable superiority for the motor-driven outfit as compared with horses. It was demonstrated that under conditions obtaining in Los Angeles one outfit of horses would sprinkle only 5 miles in a day at a cost of $4.50, while a truck would be sufficient to sprinkle nearly 30 miles in 8 hr. at a total cost of $14.71, giving better than a 50 per cent advantage in favor of the truck. In fact, it was considered to be demonstrated that each truck would save the city approximately $10 every 8 hr., regardless of the saving of the cost of water.

That this is a big item is indicated by the fact that the improved construction of the Moreland truck adopted as standard equipment eliminates all overlapping of the jets, so that they will cover the same territory as wagons even more efficiently, using nearly 25 per cent less water.

Efficiency of the trucks, however, is not fully demonstrated by confining the investigation to the superiority of the service rendered during working hours. It is pointed out by the city engineers that at the conclusion of an 8-hr. day

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horses must necessarily return to the stables and there remain idle and a source of expense for feed and care during 16 hr. On the other hand, the trucks are being operated two shifts a day, and, capacity considered, the cost of care is much lower in proportion than that of horses.

The trucks adopted are planned for flushing from the front end and sprinkling from the rear. The flushing, of course, is conducted in the night shift, and in this branch of work comparative figures with horse equipment clinched the argument for trucks even more firmly than do the comparative sprinkling costs. Actual test shows that it requires six teams to cover the territory now being done by one truck, the total cost of each truck for 8-hr. flushing being the same as for sprinkling—$14.71. The advantage over horse equipment in this work is shown by the fact that one driver, team and harness costs the city $5 per night. The flushers proper, horse equipment, were owned by the city, and the interest on the investment, depreciation and upkeep was estimated at $1 per night, bringing the total cost per horse-drawn outfit up to $6 for 8-hr. service.

A comparison of these figures with the truck costs shows conclusively that each truck saves the city practically $21.71 each night. Adding this amount to the $10 saved in the sprinkling hours and simple arithmetic shows that every day in the year for every truck operated the city saves $31.71 in the 24 hr. as compared with horse equipment doing the same work.

Watt Moreland, head of the Moreland factory, has pointed out the heavy cost of charging the tanks of the horse-drawn equipment as one reason why they make such a poor showing against the truck. The wagons compress the air for discharging the water from the pressure of the incoming stream while they are taking in water, but this pressure is gained at the expense of keeping the horse-drawn tanks at the hydrant more than half of their time. On the other hand, the trucks supply from the motor power for operating a pump which forces out the water under a 60-lb. pressure, so that all it is necessary to do is to run the water in rapidly and start the engine and get under way. Less than 2 min. is consumed in filling the 1200-gal. tanks of the truck.

The use of the 60-lb. pressure pump with properly designed jets enables the trucks to throw an evenly-distributed sprinkling or flushing sheet the full width of a 60-ft. street, with sufficient force in the flushing to remove dirt and debris and leave almost an absolutely clean pavement.

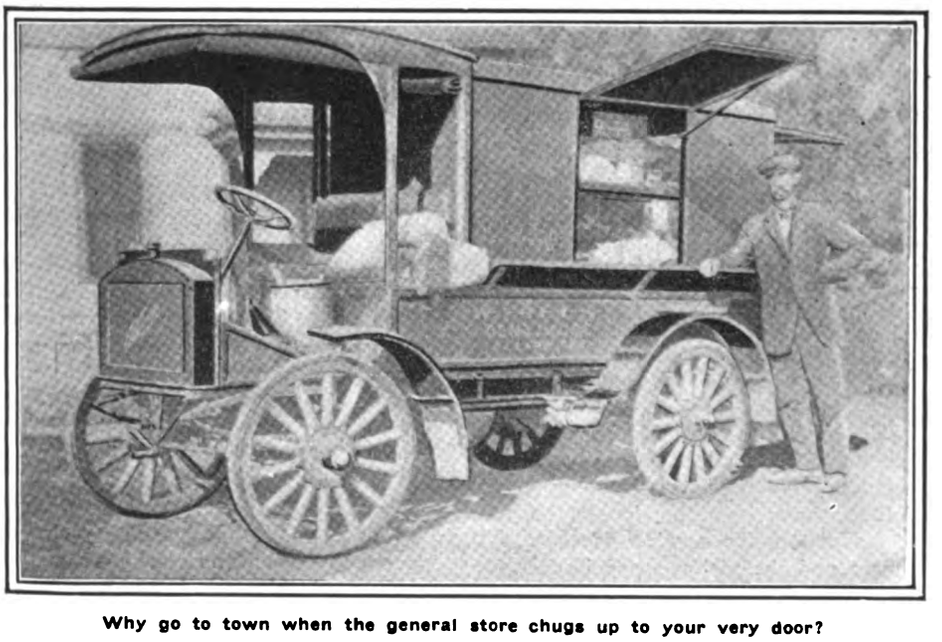
The initial fleet purchased by the City of Los Angeles consists of five Moreland trucks of the 4-ton worm-driven model, equipped with 1200-gal. water tanks. The trucks travel 8 m.p.h. in service for sprinkling and 4 to 6 m.p.h. in flushing. The nozzles employed are from a special design made in the Moreland factory and are adjustable as to flow and width of distribution of the sheet of water thrown. The control of the front flushing or rear sprinkling is effected by the driver through the manipulation of levers arranged for hand and foot control from his seat.

The trucks are driven by 50-hp. motors mounted upon Moreland stock chassis. The reduced speed as compared to ordinary commercial operation enables the motor to deliver sufficient power for the efficient operation of the pumps. The pumps employed are of the two-stage centrifugal type, double action, manufactured by Byron Jackson Iron Works, Third and San Pedro Streets, Los Angeles.

Official reports on the operations of the trucks for the past 3 months, including practically every section of the city, fail to disclose a single instance in which they have not more than doubled the efficiency of the old-time horse-drawn apparatus.

A striking illustration is furnished by the work on Grand Avenue hill. In the days of the horse it required a team and three men a full shift to flush this well-known incline. Figured in dollars and cents, this flushing was costing the city a little more than $12 per night.

One of the trucks is now flushing this same territory every night in exactly 7 min. and at a total cost of 22 cents. It is acknowledged by sanitary experts that the work of the truck is far more thorough; but even figuring the success of the work on an even basis, the truck is saving the taxpayers of this city more than $11.75 every night on the work accomplished in this single block.



Why go to town when the general store chugs up to your very door?

Truck a Country Store on Wheels

Iowa Merchant Gets Trade by Taking Goods to Buyers

BRINGING the country store to the farmer instead of requiring him to travel long distances to the store is one of the developments of modern merchandising made possible by the use of the motor truck. Three years ago, W. Frels, of O'Leary, Iowa, purchased a Little Giant truck, made by the Chicago Pneumatic Tool Co., Chicago, and equipped it with a special body featured by several shelves to carry various kinds of goods and by side doors hinged at the top on either side. The special body, as shown in the accompanying illustration, consists of six side panels, three to a side, the center one of which is hinged to the top in each case. As depicted, the entire special body is fitted within the flareboard open express body originally fitted on the truck behind the driver's cab.

The truck carries a stock of goods ranging from a package of needles to a suit of clothes and when it is driven into the customer's yard and the side doors thrown open, somewhat of a miniature department store is exposed to the customer's gaze. Articles such as brooms are carried between the flareboards of the express body and the sides of the special body, as shown in the accompanying picture.

Mr. Frels makes his truck carry full loads on both the outward and inward trips, for as soon as the merchandise is disposed of, he secures farm products from his customers either by purchase or in exchange for his goods. Vegetables or fruit thus obtained are carried back to the city and sold at a handsome profit due to the fact that the cost of haulage is practically nil because the truck has to return to the city in any event and the cost of the in-run is about the same whether the truck is empty or full.

A Variable Self and Mutual Inductor.—The Bureau of Standards has just published a paper which describes a new form of instrument for varying self inductance. It consists of two sets of coils of insulated wire mounted in circular hard rubber plates between which a similar plate carrying two coils is arranged to turn, thus varying the inductance. Diagrams and data are given from which instruments of this type may be designed to meet the requirements of a given use. Comparison is made of the new instrument and of older ones. Copies of this report, scientific paper No. 290, may be obtained without charge upon application to the Bureau of Standards, Washington, D. C.

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Devoted to topics pertinent to commercial vehicle operation design and maintenance. Open to the use of all readers. Communications must be accompanied by the sender's name and address, confidential if preferred. No charge is ever made for this service.

MAKERS OF 1,000-POUND TRUCKS

Complete Specifications to Be Given in Next Issue

To the Editor, COMMERCIAL VEHICLE:

Will you please give us the names and addresses of the makers of 1000-lb. delivery vehicles and such other tabulated data which you may have regarding the type and size of motor employed in each case, gearset, final drive, etc.?—LEWIS-HALL IRON WORKS, Detroit.

The following list of 1000-pounders includes twenty-five makes, the names and addresses of the makers being given in each case:

Atlas—Martin Carriage Works, York, Pa.

Bauer—Bauer Machine Works Co., Kansas City, Mo.

Brinton—Chester Motor Co., Coatesville, Pa.

Briscoe—Briscoe Motor Co., Jackson, Mich.

Corliss—Corliss Motor Truck Co., Corliss, Wis.

Croce—Croce Automobile Co., Asbury Park, N. J.

Crowther—Crowther Motor Co., Rochester, N. Y.

Detroit—Detroit Commercial Car Co., Detroit.

Dispatch—Dispatch Motor Car Co., Minneapolis, Minn.

Ellsworth—Mills-Ellsworth Co., Keokuk, Iowa.

Hanger—C. F. Hanger Co., Cleveland, Ohio.

Henderson — Henderson Bros., Cambridge, Mass.

Hannibal—Hannibal Motor Car Co., Hannibal, Mo.

Kearns—Kearns Motor Car Co., Beavertown, Pa.

Kosmath—Kosmath Co., Detroit.

Lawson—Lawson Mfg. Co., Pittsburgh, Pa.

Lippard-Stewart—Lippard-Stewart Motor Car Co., Buffalo, N. Y.

Pennsy—Pennsy Motors Co., Pittsburgh, Pa.

Pullman—Pullman Motor Car Co., York, Pa.

Ranier—Ranier Motor Corp., New York City.

Rush—Rush Delivery Car Co., Philadelphia, Pa.

Stewart—Stewart Motor Corp., Buffalo, N. Y.

Studebaker—Studebaker Corp., Detroit.

Vim—Vim Motor Truck Co., Philadelphia, Pa.

Wilcox—H. E. Wilcox Motor Co., Minneapolis, Minn.

Complete specifications of the above vehicles will be published in the Nov. 1, 1916, issue of THE COMMERCIAL VEHICLE.

ANALYSIS OF N. A. C. C. FORMULA

Historical Notes on Standard Rating and Explanation of It

To the Editor, COMMERCIAL VEHICLE:

Will you kindly include in your Readers' Forum in the next issue of your publication the following:

Can you give an analysis of the N. A. C. C. formula for determining the horsepower of any gasoline motor which is $\frac{D^2N}{2.5}$, in which D is the diameter and N the number of cylinders?

Why divide by 2.5? Why is it not necessary to take into consideration the length of stroke? Are there other formulas for figuring horsepower, and, if so, what are they?

What is the A. L. A. M. formula and what do these letters stand for?

It is my understanding that the N. A. C. C. formula is being accepted as standard almost entirely. I have in mind a truck manufacturer who formerly made a ½-ton truck with a motor of two cylinders, 5-in. bore by 5 in. stroke. By the N. A. C. C. formula the horsepower figures 20 hp. The same company now makes a 1-ton truck with a four-cylinder motor, 3½ x 5¼. By N. A. C. C. rating this motor delivers 19.6 hp. This seems all out of line to me, and suggests that something is wrong with the N. A. C. C. formula.—H. W. SHUGART, Knoxville, Tenn.

The N. A. C. C. formula is based upon the fact that, all other things being equal, a four-cycle gasoline engine will deliver power in proportion to the area of its piston, the number of these cylinders and the piston speed in feet per minute.

In the formula the area of the piston is found by dividing the square of the diameter by 0.7854, the total piston area of the engine being equal to this amount multiplied by the number of such cylinders. The engine will give, according to exhaustive experiments, just so much horsepower per square inch of total piston area under given conditions, varying with the speed at which the piston reciprocates. At the time the formula was computed it was general practice to run engines as nearly at 1000 ft. per min. for maximum power as was practicable. By taking the divisor 0.7854, that for power per square inch of piston area and that for 1000 ft. per min. together, a product of 2.5 was arrived at for four-cycle motors. If it is desired to follow this more closely one may study the following explanation as given in the *S. A. E. Data Book:*

"The indicated horsepower of a single-cylinder, four-cycle engine is equal to one-quarter times the mean effective pressure, P, acting throughout the working stroke, times the area of the piston, A, in square inches, times the piston speed, S, divided by 33,000, thus:

$$\text{I.H.P.} = \tfrac{1}{4}\,\frac{PAS}{33{,}000}$$

"Multiplying this by the number of cylinders, N, gives the I.H.P. for an engine of the given number of cylinders, and further multiplying by the mechanical efficiency of the engine, E, gives the brake horsepower. Therefore the complete equation for B.H.P. reads:

$$\text{B.H.P.} = \frac{PASNE}{33{,}000 \times 4}$$

"The A.L.A.M. assumed that all motor car engines will deliver or should deliver their rated horsepower at a piston speed of 1000 ft. per minute, that the mean effective pressure in such engine cylinders would average 90 lb. per square inch and that the mechanical efficiency will average 75 per cent.

"Substituting values in the above B.H.P. equation and substituting for A its equivalent $0.7854D^2$, the equation reads:

$$\text{B.H.P.} = \frac{90 \times 0.7854D^2 \times 1000 \times N \times .075}{33{,}000 \times 4}$$

and combining numerical values it reduces to:

$$\text{B.H.P.} = \frac{D^2N}{2.489}$$

or, in round numbers, with a denominator of 2.5."

From the above it is seen that the figure 2.5 is arrived at by scientific means and is based on real average conditions prevailing at the time the formula was devised. Practically the same formula is used generally abroad. The length of stroke and many additional factors are automatically taken care of by assumption, as will be seen above.

There are other formulas—in fact, they are legion—but none but this one has ever received universal sanction. A formula of this sort is at best but a compromise, and is only intended as a

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method of fair comparison and as a basis for taxation. There is much that cannot be determined by formula and there are so many other factors which cannot be taken into account that it is hopeless to derive the actual horsepower of an engine from abstract mathematics. *Motor Age* some years ago, working on the standard formula as a basis, computed a formula which permitted one to find the horsepower at different piston speeds. This formula read:

$$\text{Hp.} = \frac{D^2 N S R}{15{,}000}$$

The A. L. A. M. formula and the N. A. C. C. formula are identical. The A. L. A. M., Association of Licensed Automobile Manufacturers, was formed by manufacturers who held Selden patent licenses, engaging in both engineering and commercial work. When the Selden patent was no longer effective the body split into two associations, the Automobile Board of Trade, a commercial body, and the Society of Automobile Engineers, an engineering one. Later the National Assn. of Automobile Manufacturers, which consisted of manufacturers not licensed under the Selden patents, combined with the Automobile Board of Trade and formed the present National Automobile Chamber of Commerce. Most of the engineering data and standards of the A. L. A. M. were taken over by the S. A. E., but so far the S. A. E. has not given formal sanction to the A. L. A. M. horsepower formula. This, however, the N. A. C. C. has done, whence the formula receives its present title.

The reason why the four-cylinder motor to which reference is made is rated at lower power than the two-cylinder one is because it is assumed that both motors will have the same mechanical efficiency and the same piston speeds, whereas probably the four will have higher efficiency and may be operated at higher piston speeds, hence will give more actual power.

There is something wrong with the N. A. C. C. formula, if one wishes to get the actual power of an engine, but for purposes to which it is applied it is a fair rating.

FREIGHT WORK PACKAGE TRUCKS

Many Articles on Such Work Published In The Commercial Vehicle

To the Editor, COMMERCIAL VEHICLE:

Will you please advise us what issues of THE COMMERCIAL VEHICLE contained articles relative to the use of motor trucks for handling package goods between the shipping rooms of their owners to the freight stations?—BEATON & REHM, Chicago.

THE COMMERCIAL VEHICLE has published a great number of articles relative to the use of motor trucks in the work of hauling package goods to freight stations, some of the most recent of these being as follows:

Nov. 15, 1914; page 5:

A description of the system used by Sears, Roebuck & Co., Chicago, in which some of their trucks are employed in hauling merchandise mail from the plant to the downtown passenger stations.

May 15, 1915; page 21:

A description of the trucking system used by the Loose-Wiles Biscuit Co., Long Island City, N. Y., in which is shown the special layout of the plant and the method of loading cans and boxes of biscuits for haulage to the various railroad and steamship terminals in the greater city.

June 15, 1915; page 5:

Part III of the serial article regarding the Loose-Wiles Biscuit Co., in which are described the methods of loading at the plant.

July 1, 1915; page 20:

Part IV of the Loose-Wiles article, which comprises a first-hand study of the work of the company's trucks in the haulage to the freight terminals. The article includes two maps showing the routes covered by two freight trucks on which observers of THE COMMERCIAL VEHICLE rode. The logs of these trips are also published in full and deductions are made which show the efficiency of the trucks in the work.

July 15, 1915; page 5:

The fifth and concluding article descriptive of the Loose-Wiles truck fleet. The article is entitled, "How Loose-Wiles Freight and Agency Trucks May Be Made More Efficient." As this title indicates, the article seeks to point out how the trucks may be made more efficient even under the poor existing conditions at the railroad and steamship freight stations. It points out where the truck delays occur and how these delays can be eliminated by means of nest or trunk bodies, roller gravity conveyors and an improved method of checking the loads as they are put into the trucks.

Aug. 1, 1915; page 5:

An article descriptive of the plant, loading methods and delivery methods of B. T. Babbitt, Inc., New York City, a large soap and washing-powder manufacturer. Part of that company's goods are delivered from the plant in Babbitt, N. J., to the pier freight stations along the Hudson River.

Aug. 15, 1915:

A description of the plant and delivery equipment of the Central Stamping Co., Newark, N. J. That concern employs electric trucks to make the 10-mile haul from its plant to the waterfront freight stations in New York City and Brooklyn. The article also tells how the company increased the efficiency of its trucks in the haulage to the piers by a new internal handling system. This system is explained in full and its workings illustrated by half-tone and line cuts. It also tells of a bonus system for the drivers of the freight package trucks to get them to make two trips per day and overcome unnecessary delays at the ferry houses on the Hudson River.

Sept. 15, 1915; pages 5 and 18:

An article descriptive of the plant and delivery equipment of Austin, Nichols & Co., large Brooklyn, N. Y., wholesale grocers. The article describes and illustrates the efficient internal package-handling system of the concern, which includes spiral chutes from floor to floor and electrical industrial trucks.

A description of truck fleet and operating methods of the Barcalo Mfg. Co., Buffalo, N. Y., whose business is the manufacture and wholesale distribution of brass and iron bedsteads, springs, mattresses and small tools. Eighty per cent of the company's business is trucked over the streets for shipments in less-than-carload lots from the freight terminals. The article also contains the tabulated results of two time studies of truck operations to and from the various freight terminals.

Oct. 15, 1915; page 5:

The plant and trucking system of the Larkin Co., Buffalo, N. Y., are described and discussed in the article in the issue mentioned directly above. The Larkin Co. is a mail-order house which differs from other concerns of like character in its large premium business. Some of the company's goods are handled in l.c.l. shipments between the plant and the freight station.

Nov. 15, 1915; page 5:

The article in the issue above describes the novel use of demountable bodies at the plant of the Curtis Publishing Co., Philadelphia, Pa., and at the Broad Street station of the Pennsylvania Railroad in that city for the rapid loading and unloading of the Curtis company's outgoing mail and magazine matter.

If you desire to go more fully into the question of terminal congestion, we refer you to an exhaustive article relative to the congestion at the stations along New York City's waterfront which appeared in THE COMMERCIAL VEHICLE of July 15, 1913. Observers actually timed a large number of vehicles which arrived at various of the pier stations during a several-day period. The results of these observations are included in full, and show the time lost waiting in line, time of loading and unloading, and the ratio of the lost time to the total time.

An Illustrated Lecture on Road Construction by means of using White trucks was given by the White Co., Cleveland, Ohio, at the Boston City Club, Boston, Mass., a few nights ago. It was attended by a large number of highway officials from various parts of Massachusetts. Representatives of the factory produced the lecture and Manager J. S. Hathaway of the New England branch had charge of the invitations.

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Convertible Bus Body and Two Dumping Types

Two-tonner on Pneumatics for Speed—Trailer Carries Own Jacks

EQUIPPED with pneumatics all around, the 2-ton Selden truck shown in Fig. 1 is used by the New York State Railways in Rochester, N. Y., and its surrounding territory for the haulage of material used in the maintenance and construction of that company's trolley lines. It is equipped with a hand-dumping steel body which has an inclined bottom so that it does not have to be elevated to the same angle it would if level-bottomed. This is a time-saving feature of some moment but which is not as important as the time saved on the truck's long hauls from Rochester to the outlying points secured by the use of pneumatic instead of solid tires.

The body is of thick sheet steel with outside angle-iron reinforcements which extend clear around the bottom and up on each side to the top edges which are further reinforced by means of additional angle irons. The angle of the bottom is such that the front end is about half the height of the rear end. The top of the rear end of the body is further braced by a cross piece to which is hung a steel tailgate. This opens automatically by gravity as the body is elevated. It is locked in position when the body is down by means of a cross bar at the bottom with retaining lugs.

The elevating mechanism is of the rack and pinion type. A curved, slotted rack, with teeth on the forward half only, is attached to the front of the body on each side. The two driving pinions, which mesh with the racks inside of the slots, are carried on the ends of a horizontal shaft supported at the top of an A-frame between the front end of the body and the rear of the driver's cab. This frame also carries a second horizontal shaft with gears which mesh with those on the pinion shaft and on a third horizontal shaft on which the hand crank is fitted on the right side of the truck.



Fig. 2—An 11-ton Mack AC tractor-and-trailer outfit in which the jacks for elevating the front end of the semi-trailer are carried beneath the trailer body

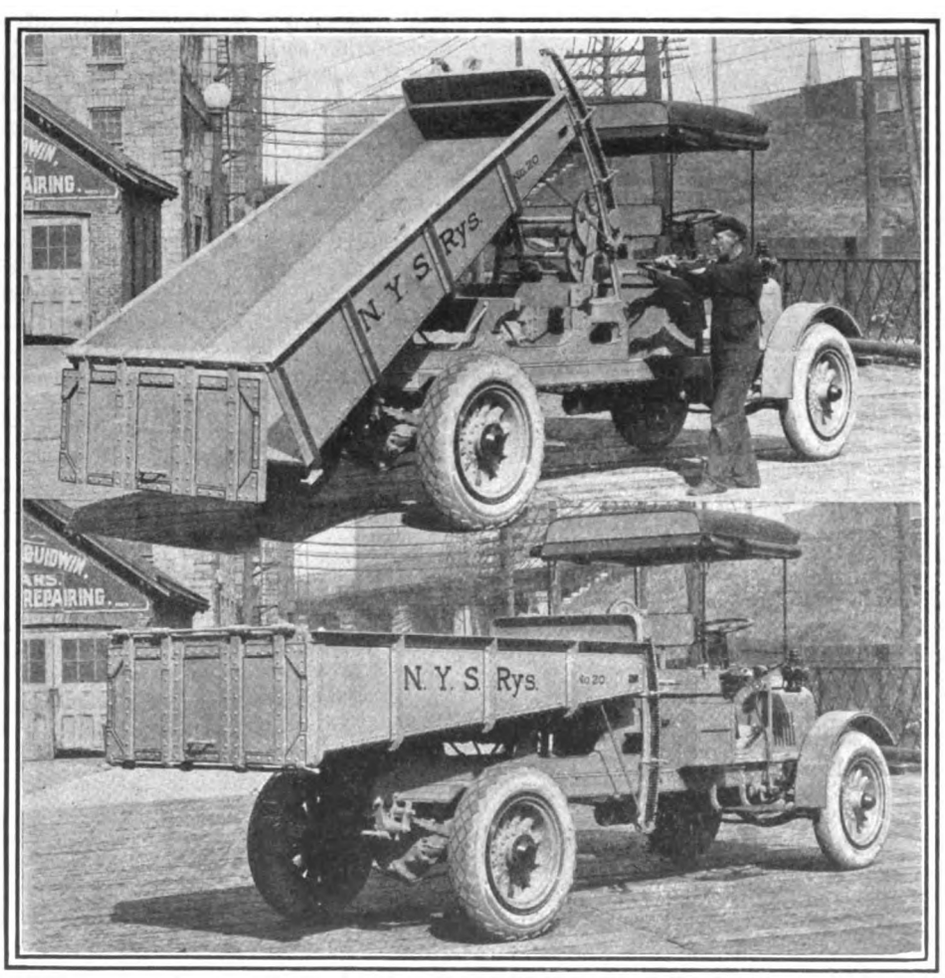


Fig. 1—A Selden 2-tonner equipped with pneumatics all around for speed. The steel body fitted has an inclined bottom to lessen the necessary angle of elevation for quick discharge. The body is raised by means of racks and pinions operated by a hand crank

Milk Tractor Carries Own Jacks

THE 11-ton milk tractor and semi-trailer outfit shown in Fig. 2, differs from other equipment of this nature which is now commonly used by almost all of the large dairy companies in New York City, in that the jacks for lifting the front end of the trailer off the tractor fifth-wheel are carried at all times by the trailer itself.

The usual practice in detaching the trailer from the tractor has been to employ jacks kept at the points of loading and unloading. As a tractor was backed up to either the loading or unloading platform, the trailer was jacked up by the removable jacks and then lowered down onto some form of wooden horse so that the jacks could be used to detach other trailers from their tractors as they happened to arrive. This method often resulted in the loss of much time, especially if more tractor-and-trailer outfits happened to arrive than could be handled simultaneously with the number of jacks available.

By the new method as illustrated in Fig. 2, each trailer is fitted with twin elevating jacks pivoted on carrying

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frames at the cross member on the bottom of the trailer body under which the jacks are placed to elevate it. In operation, each jack is swung down until it rests on the ground after which it is elevated by a handle to such height as will permit the tractor to pull out.

After the trailer has been deposited on the tractor fifth-wheel the jacks are swung up about their pivoted holding frames and held in place beneath the trailer body. The motor unit illustrated is one of the new Mack AÇ tractors made by the International Motor Co.

Convertible Bus-Baggage Body

CONVERTIBLE from a seven- to ten-passenger bus body to a purely baggage or conventional delivery body, that shown in Fig. 3, is characterized by its low-sided passenger car type body with an eight-post top and its three doors, two on the curb side and one on the opposite side to enter the driver's cab.

As shown, two crosswise seats are employed. One of these, that on which the driver sits, is permanent, while the other can be removed if it is desirable to carry other than passengers. The latter seat can also be placed looking forward or to the rear. When facing the rear, the tailboard can be hooked by means of leather-covered chains on the sides at an angle to the body bottom, thus forming a foot rest for the passengers on that seat. If freight or baggage is to be carried, the rear seat is removed.

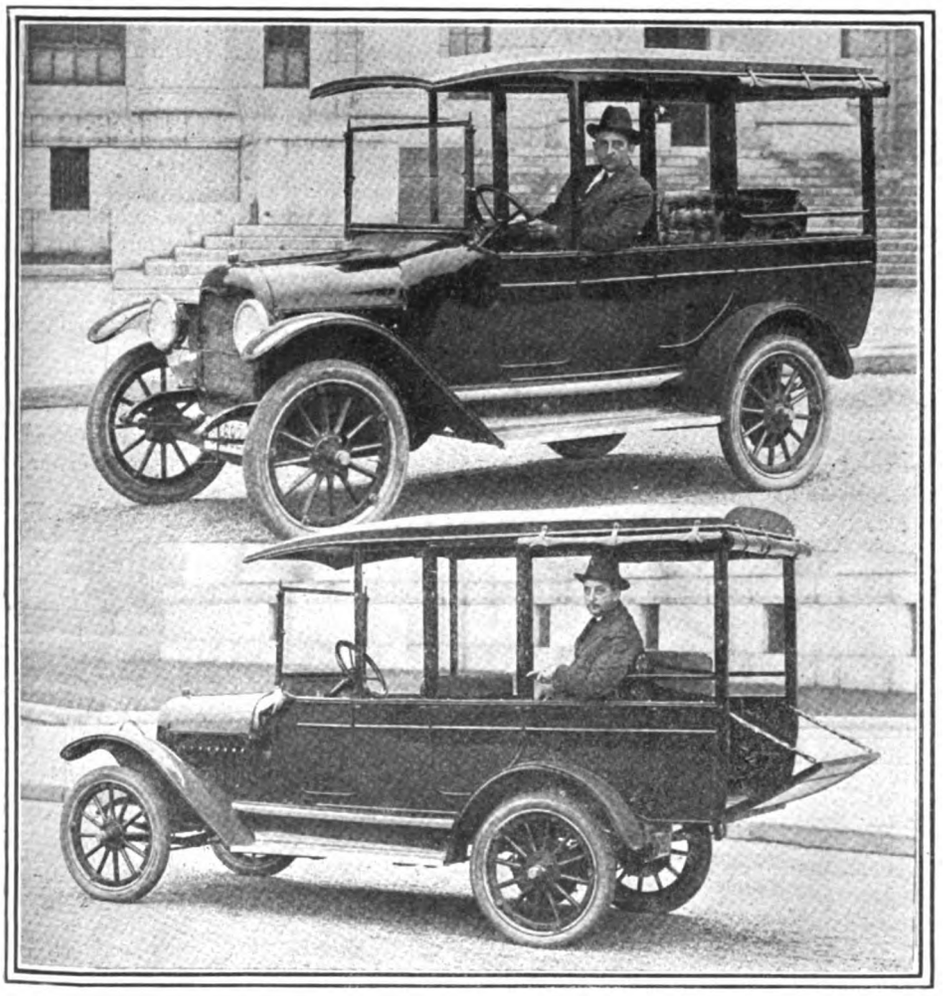


Fig. 3—A novel type of convertible passenger and station vehicle body with two cab doors and one in after portion of body on the curb side. The rear cross seat is removable. The body is mounted on a Maxwell chassis

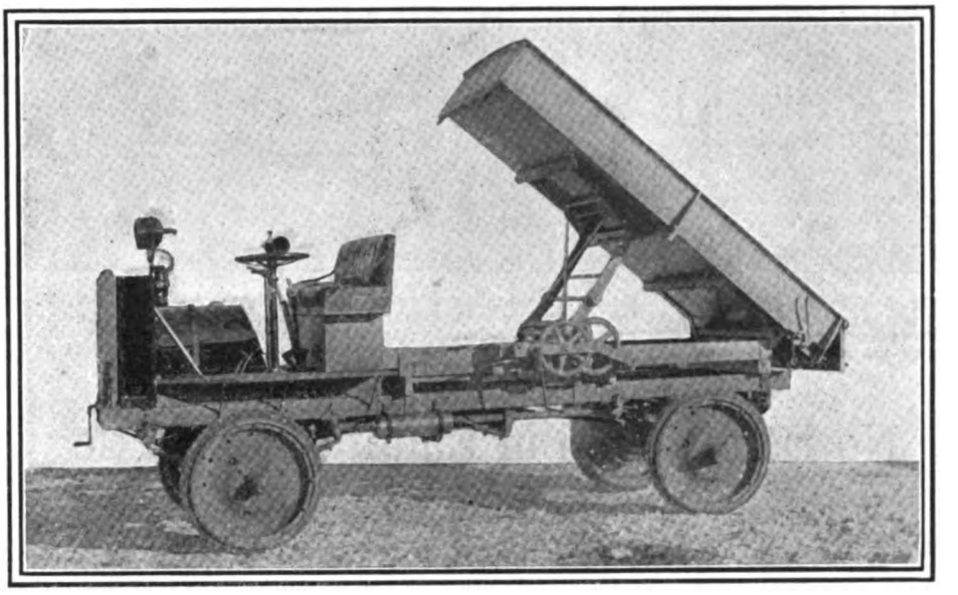


Fig. 4—A Lally steel body for coal merchants and contractors which is elevated to an angle of 45 degrees by jack-knife lever mechanism. The body is pivoted at the rear end and is shown mounted on a Jeffery 2-ton Quad

Besides the removable seat, the equipment furnished consists of roll curtains on each side from the rear of the rear side door to the end of the body and for the rear of the body itself and snap-on curtains from the front of the rear-most side door to the windshield.

The body is 41 inches wide on the floor and 43 inches wide at the top of the side panels. The latter are 21 inches high. The body is 57 inches high and the clear space aft of the rear of the driver's seat with the removable seat out is 66 inches.

The body shown is designed and manufactured by the B. Kingsley Co., Boston, Mass.

Lally Jack-knife Body Lift

HAND operated by means of a jack-knife type of mechanism, the steel body shown in Fig. 4 is especially adaptable to the delivery work of contractors and coal companies because it can be elevated to an angle of 45 degrees which insures a speedy disposal of the material carried. As illustrated, the body is made of sheet steel with reinforcing members on the sides at the ends and the centers and with channel irons on the bottom. It is equipped with a tailgate arranged to swing from the top. It is held at the bottom by a lug catch which may be released from the left side when the body is inclined. The tailgate is also provided with a scuttle door for chuting or basketting coal to be carried into the homes of the purchasers.

The elevating mechanism consists of a two-part lever framework which is folded down beneath the body when the latter is down but which extends as the body is elevated by means of a train of gears operated by a hand crank. The body is manufactured by the Lally Commercial Body Co., Everett, Mass.

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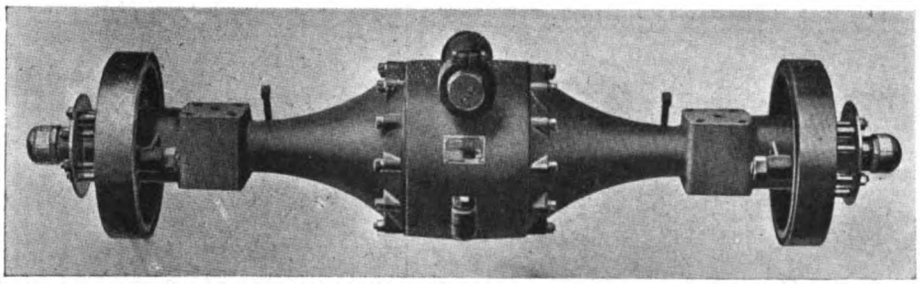


Fig. 1—The new 1-ton worm-driven axle made by the Empire Axle Co., Dunkirk, N. Y. It is characterized by the fact that it has no differential and is the first stock axle to be so offered on the market in this country. The housing is of the three-piece type, following previous Empire practice. The central part of the housing carries the worm and wheel as a complete unit

No Differential in Empire 1-ton Axle

Central Part of Three-piece Housing Carries Worm—Brake Shafts Oiled from Inside

NO differential is fitted in the new 1-ton worm-driven truck axle just brought out by the Empire Axle Co., Dunkirk, N. Y. This is the outstanding feature of the new axle, which was designed primarily for use by trucks of 1-ton capacity to sell at less than $1,000 and for converting passenger-car chassis into trucks of 1-ton burden. It is the only stock worm-driven axle so far to be placed on the market in which the almost universally-adopted differential has been eliminated.

As pointed out in the May 1, 1916, issue of THE COMMERCIAL VEHICLE, tests conducted with motor trucks abroad and with the buses of the Fifth Avenue Coach Co. in New York City apparently showed that the removal of the differential from a live driving axle and the use of a solid axle instead results in better traction in snow and on bad roads, less skidding when the brakes are applied, greater tire mileage and a great reduction in the weight of the axle itself.

These, then, appear to be the outstanding qualifications of the new axle. The elimination of the differential enables a live axle to be used which is sufficiently strong to carry the weight and take the drive. This means that the casing for the worm gear need only be strong enough to support the driving stresses without any weight-carrying function.

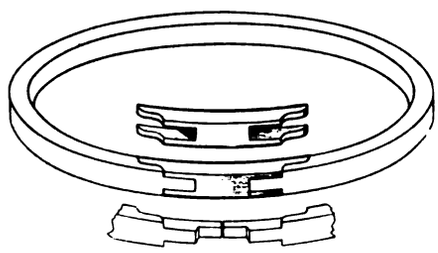


Fig. 3—The Union two-part piston ring with a right-angled joint and a U-shaped notched lap member. Note that the ends of the latter are within the ring groove when the ring is in the piston and the latter in the cylinder, thus tending to eliminate the breakage of the member ends. Note the method of notching the ring in the way of the joint

The elimination of the differential and the resultant decrease in the weight of the necessary housing makes the new axle light and simple.

The axle is designed to take both the propulsion and the torque through the springs, and is provided with a three-piece housing which follows previous Empire design. The center housing carries the worm and the worm wheel as a complete unit.

As shown in Fig. 2, the complete housing is open from end to end and is characterized by a new construction in which the brake-shaft bracket is hollow and in open communication with the interior of the remainder of the housing, thus insuring the brake shafts a sufficient quantity of oil for lubrication.

The worm and worm wheel are of the straight type. The worm is of 3½ per cent nickel steel, case-hardened and then ground to the correct tooth form. The worm wheel is cast from special phosphor bronze of high tensile strength. It is cut by the hobbing process, thus producing a generated tooth.

The driveshafts are of chrome nickel steel, heat-treated and ground to size. They are of the three-fourth-floating type and are supported at the wheel ends on double-row radial-and-thrust type ball bearings, as is shown in the left of the section in Fig. 2. As shown in the section at the right in Fig. 2, the worm thrust is taken by double heavy-duty ball thrust bearings and the radial loads by two roller bearings of the Hyatt type.

The brakes are of the internal-expanding type, with drums 13½ in. in diameter and 2¼ in. wide. The spring pads, which are integral with the side housings, are cubical in shape and hollow, forming the open interior connection between the housing proper and the brake-shaft supports. The spring centers are 38 in. apart, and are designed for springs 2½ in. wide.

The track of the axle is 56 in. and the ratio between the worm and the worm wheel is 7.2 to 1. The axle is designed for a rated load of 3550 on the tires, including chassis, body and live load.

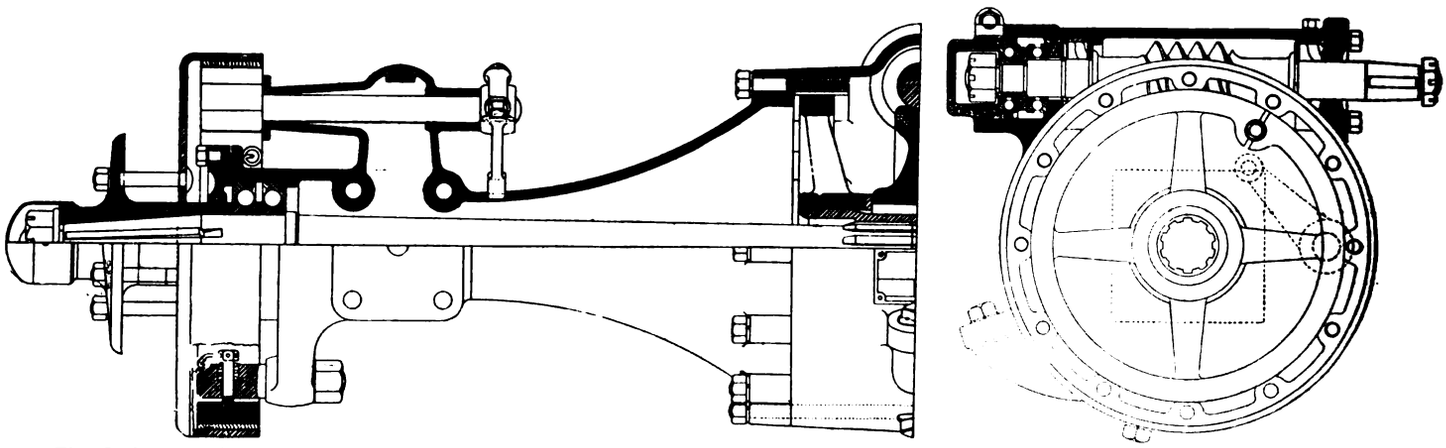


Fig. 2—Longitudinal half section and section through the worm carrier of the new Empire 1-ton axle which has no differential and which is designed for use on trucks of that capacity to sell at less than $1,000. Note that the spring pads are cubical and hollow, and that the brake shafts are lubricated from within the housing through the open communicating passage formed by the hollow spring pads. Also note the straight worm and how it is carried on thrust ball bearings and straight roller bearings for the radial load. The axle is of the three-fourths floating type, mounted on double-row radial-and-thrust type ball bearings at the wheel ends

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TRUMP TIRE-SAVING JACK

Designed as pneumatic tire-saving jacks for passenger cars or light delivery vehicles, the Trump jack, made by the Trump Products Co., Chicago, consists of a hollow. rectangular frame inside of which is placed a U-shaped bar. The open ends of this bar are bent over and inserted in any one of a series of four holes punched in each of the side members of the hollow frame, as shown in Fig. 5. The U-bar is kept in a plane with that of the frame by means of a cross-hook at about the middle of the frame which is inserted into place in much the same manner as is the U-shaped bar.

The method of jack operation is shown clearly in the three views of Fig. 5. In the first step of the operation the jack is stood up alongside the wheel to be raised, as shown in the left view of Fig. 5. The U-shaped bar is then pulled out of its plane of the frame and placed under the wheel hub. The frame is then revolved down away from the wheel, as shown in the center view, and the U-shaped bar adjusted to fit under the wheel hub by putting it in one set of the holes in opposite sides of the frame. Due to the fact that the lowest hole on each side is several inches above the bottom of the frame enables the latter to serve as a lever when it is lifted to the vertical position. This lifts the wheel off the ground, as shown in the view on the right.

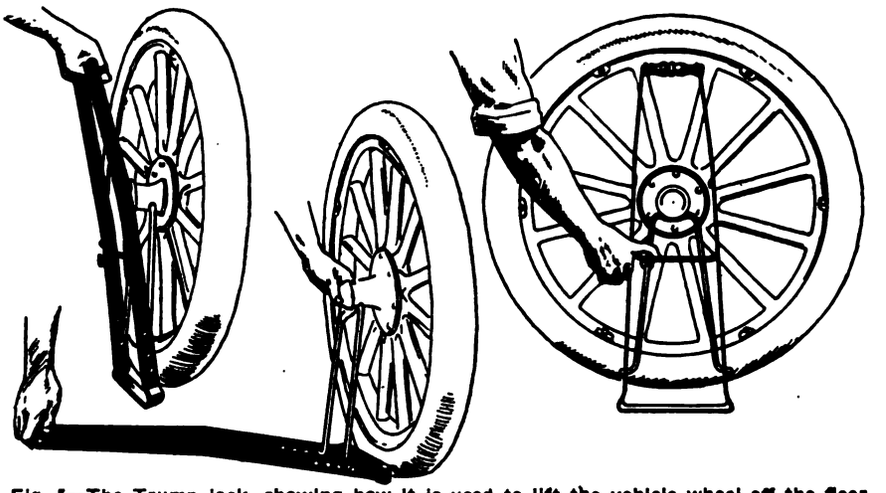


Fig. 5—The Trump jack, showing how it is used to lift the vehicle wheel off the floor to relieve the tire of the car weight. They also serve to protect the tires from the deteriorating effect of oil upon them. should any happen to be on the garage floor. The three views show the three operations required to lift the wheel off the floor

WOODWORTH SPRING COVERS

Laced like a glove, the Woodworth spring cover is designed to lubricate motor vehicle springs and to prevent moisture or dirt getting between the leaves. As shown in Fig. 4, the cover is made of a trapezoidal piece of leather which is slipped over the spring and laced together at the bottom by means of leather thongs around hooks along the edges. The cover is lined with a felt wicking, which is saturated with oil before the cover is put on. The wicking will absorb enough oil to lubricate the spring for at least 10,000 miles of running.

The covers, which are the product of the Leather Tire Goods Co., Niagara Falls, N. Y., are offered in two different grades, one of genuine leather and the other of imitation leather. Both are especially treated to make them oil and waterproof.

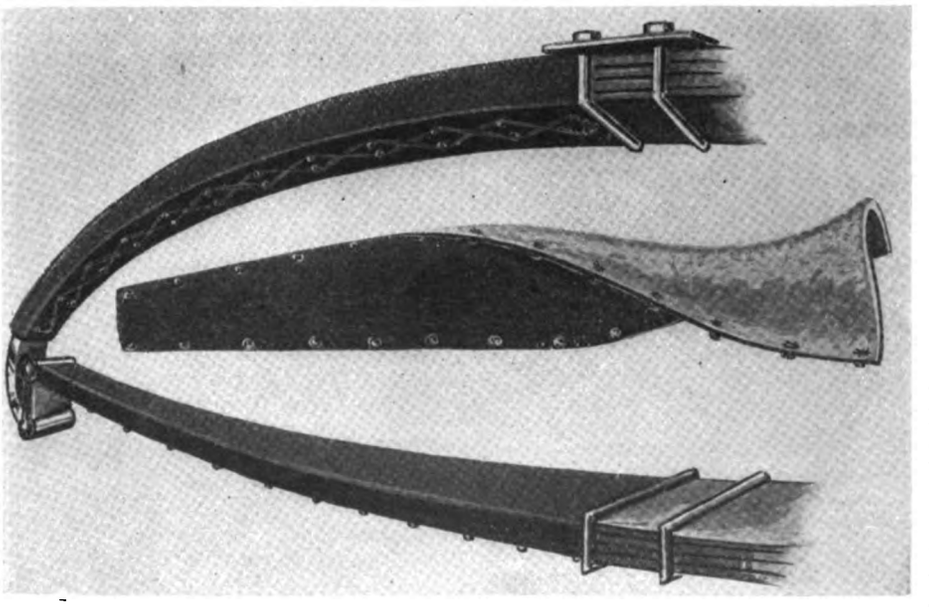


Fig. 4—The Woodworth spring cover which is laced in place like a glove. It is made of a trapezoidal piece of leather which is slipped over the spring and pulled together at the bottom by means of leather thongs around hooks along the edges

UNION TWO-PART PISTON RING

Union piston rings, a new product made by the Union Products Co., Rockford, Ill., are of the two-part type. As shown in Fig. 3, each ring is of rectangular cross section with a right-angled joint. In the way of the joint, the ring is notched from the outer edge as shown in the accompanying sketch. It is also notched on the top and bottom of the ring either side of the joint. The top and bottom notches are round cornered to allow of ring expansion.

The joint-lap member fits snugly into the grooves of the ring proper and covers up the joint. It is H-shaped, as seen from the side of the ring, with a narrow portion on top and bottom of the same width as that of the ring.

Trucks Help Build Cleveland Bridge

(*Continued from page* 9)

R. W. Blake, another hauling contractor on the work, employed six White 5-ton power-dumping trucks on the job. These hauled 12,692 tons of sand; 14,758 tons of gravel and 1,653 tons of limestone in addition to much other miscellaneous material. These trucks worked continuously 24 hr. a day for over 2 months in the haulage of the wet concrete for the building of the west piers. The material was hauled over a 1-mile course, the trucks crossing two draw-bridges, a railroad and climbing the Detroit Avenue hill which has a 10 per cent grade. One of these vehicles made over thirty-five trips in 10 hr., hauling between 175 to 200 tons of material.

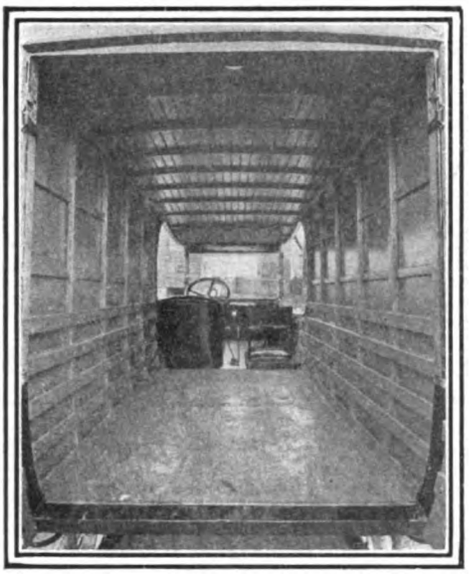
Haul 400,000 Bags of Cement

The Cleveland Builders' Supply Co., which owns a fleet of nine White trucks, hauled approximately 400,000 sacks of cement and lime to the new bridge. Four White trucks owned by the Cuyahoga Builders' Supply Co., hauled 180,000 sacks of cement to the bridge. The material was hauled from the company's warehouse ¾-mile from the bridge and each truck was able to load, carry the material to the bridge, unload and return to the warehouse within a 30-min. period.

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Inter-State, a New 850-pounder, Sells at $850 with Body

Has Complete Electrical System and Governor

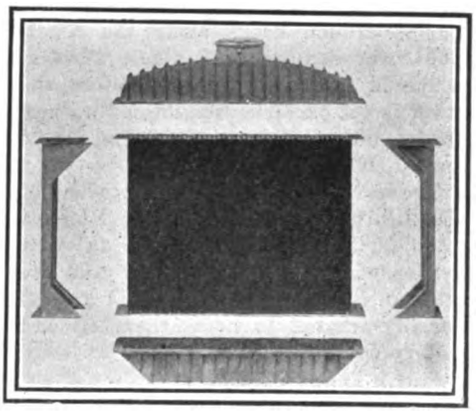


Interior view of the Inter-State 850-pounder showing driver's seat at left; center control and fold-down helper's seat at the right. The body interior is electrically lighted from a dome on the ceiling

ANOTHER entrant into the light delivery car field is the Inter-State Motor Co. of Muncie, Ind., which has just brought out a new 850-lb. vehicle to sell complete with a standard type of panel body at $850, or at the rate of $1 per pound of carrying capacity. The new vehicle is mounted on the passenger car chassis manufactured by the Inter-State company and is offered with the intention of meeting the delivery needs of clothiers, confectioners, grocers and the ordinary small merchant. This is a field which manufacturers have realized contains great opportunities because of the large number of small merchants who still persist in the use of horse wagons because of an apparent inability to procure a really efficient light delivery motor at somewhere near the cost of the horse equipment.

The new vehicle is known as the De Luxe delivery model because of its body, which is of very pleasing appearance, with a closed cab for the driver and a folding seat for the driver's helper, which can be swung down out of the way on a small wooden platform on the cab floor when not in use.

The body is also lighted by means of an electric light dome on the underside of the roof near the rear end. This convenience is designed to prove of service to the driver or his helper in locating packages to be delivered without striking matches or losing considerable time on cold wintry days in trying to light them. This, with the closed cab for the driver, is a continuation of the present trend in commercial vehicle design to make it as comfortable as possible for the driver, realizing that a comfortable, satisfied driver can do much more work than a cold and disgruntled one.



The dis-assembled parts of the vertical finned-tube radiator used on the Commerce 1-tonner. Note the removable finned top casting

In addition to the closed cab and the electrically-lighted body interior, the vehicle is also equipped with an electric self-starter which will make it easier for the driver and also eliminate the necessity for keeping the motor running at full speed during stops on winter days.

INTER-STATE SPECIFICATIONS

Capacity	850
Price	$850
Wheelbase	110
Tires, front	33 x 4
Rear	33 x 4
Motor, bore	3½
Stroke	5
N. A. C. C. hp.	19.61
Speed, r.p.m.	...
M.p.h.	20
Gear-ratio in high gear	4 to 1
Final drive	Bevel

The motor is a specially-built 3½ x 5 Rutenber model, having the four cylinders cast in one block with the valves located overhead in a removable cylinder cover.

Lubrication is by circulating splash operated through a gear-driven pump from the camshaft. The oil is contained in the bottom pan of the crankcase, being carried from the reservoir by the gear pump to the bearing leads.

The gasoline system consists of a cowl tank with gravity feed to a Schebler carbureter. A gasoline gage which registers the depth of the fuel in the tank is mounted on the cowlboard in plain view of the operator.

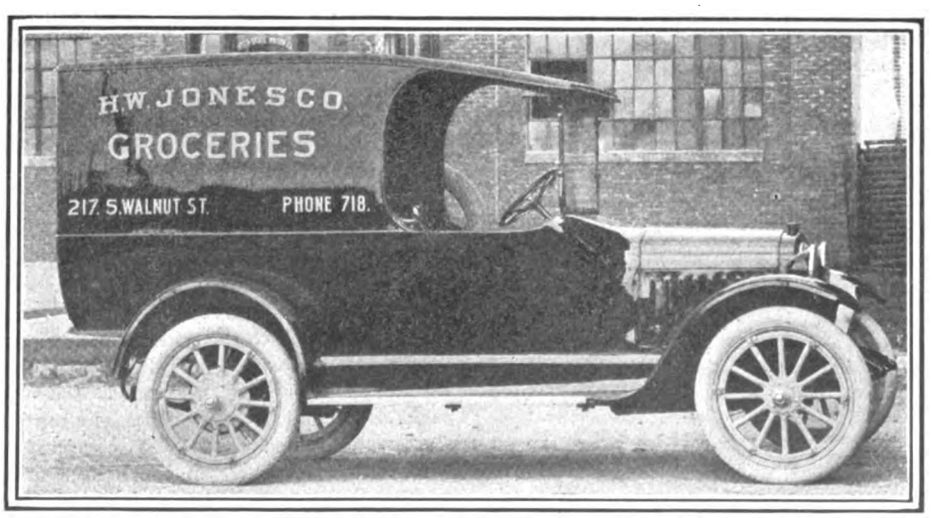
One other point of difference between the vehicle and the passenger car produced by the Inter-State company, aside from the body, is the employment of a Pierce governor on the commercial model to limit its maximum speed to 20 m.p.h.

Electrically the Inter-State is Remy equipped, having this system for starting, lighting and ignition. The distributer is mounted on the left side of the motor block with the coil directly aft it. The ignition distributer drive is taken off the generator shaft by bevel gears, the generator shaft and the oil pump shaft being connected by means of a flexible coupling. The starting motor is at the rear on the right and engages with a ring on the forward edge of the flywheel. All the heavy wiring of the electrical system is inclosed in flexible metal conduits.

From the motor the drive is taken through a leather-faced cone clutch to a three-speed gearbox mounted in a unit with the rear axle. The drive is by direct bevel. The axle shafts are floating and are carried on Hyatt roller bearings.

The frame is of pressed steel, bottle-necked in front. Semi-elliptic springs, 36 by 1¾ in., are used in the front, and three-quarter-elliptics, 46 by 2 in., in the rear. Tires are 33 by 4 in. all around, with non-skids furnished on the rear as standard equipment.

The loading dimensions of the standard body are as follows: Width, inside, at bottom, 42 in.; width, inside at top, 46 in.; height, 51 in., and length from the back of the seat to the double rear doors, 65 in.



Side view of the Inter-State 850-pound delivery vehicle showing the standard panel body which is sold with the chassis at $850. Note the driver's closed cab

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New Commerce 1-tonner Is Driven by Internal Gears

Design Is Similar to That of ¾-ton Vehicle

COMMERCE SPECIFICATIONS

Capacity, lbs.	1,500	2,000
Price	$875	$1,775
Wheelbase, in.	120	126
Tires, front	34 x 4½	34 x 4
rear	34 x 4½	34 x 4
Bore	3½	3½
Stroke	5	5
N.A.C.C. hp.	19.61	19.61
Speed, r.p.m.	1,630	1,383
m.p.h.	25	20
Gear-ratio in high gear	6-1	7-1
Final drive	bevel	internal gear

ABANDONMENT of its single-model policy is marked by the production of a 1-tonner in addition to its ¾-tonner by the Commerce Motor Car Co., Detroit. While similar to the lighter Commerce in general outline, this new truck differs in its final drive, which is by internal gears instead of the direct bevel gear used on the smaller type, made necessary by the lower reduction required, and in the use of solid tires instead of pneumatics.

Like the 1500-pounder, the 1-tonner is started and lighted electrically.

The motor, a Continental, is mounted on three points, under a conventional hood, incorporated in a unit with the clutch and gearbox. Cylinders are cast in block, carrying the valves at the side, and the crankshaft is carried on three bearings.

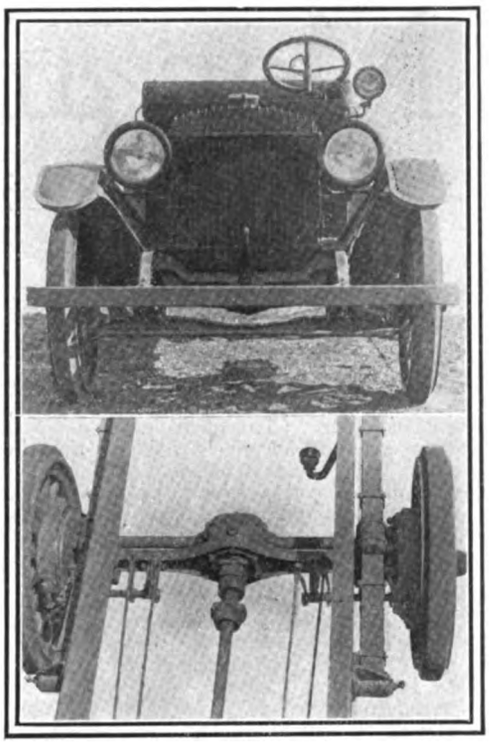
Thermo-syphon water circulation cools the motor through a finned-vertical-tube Long radiator in a cast-iron casing. The carbureter is a Zenith, fed by the Stewart vacuum system from a tank beneath the driver's seat. A Pierce governor, driven off the motor, limits the speed in accordance with accepted standards.

Although the Remy starting and lighting system is used, ignition is supplied separately by an Eisemann single magneto with fixed spark advance. A Willard storage battery is used in connection with the Remy system. In addition to side and tail lamps, there is a spotlight on the dash, useful in making night deliveries for picking out house numbers and street signs.

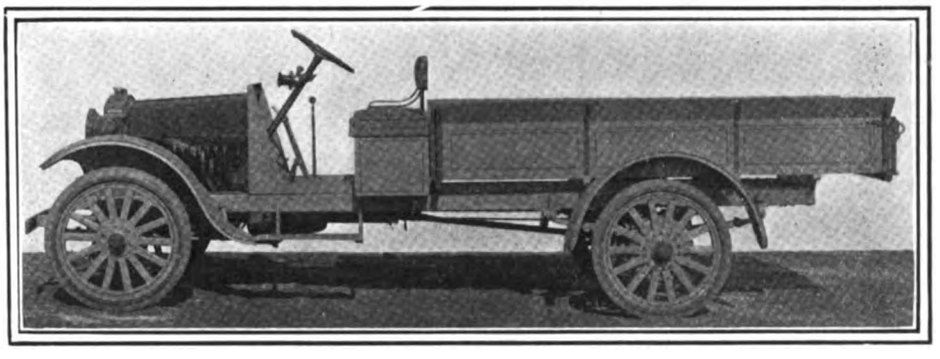
From the motor the drive is through a leather-faced cone clutch and three-speed selective gearset, both of Detroit Gear & Machine Co. make, through a tubular driveshaft with Arvac joints to the Torbensen rear axle. The brakes on this axle are concentric, the foot brakes acting externally and the hand brakes internally. Hotchkiss drive is taken by the Detroit springs.

The frame is of pressed steel of flexible construction, and the wheels are of wood with square spokes. Although solid tires are standard equipment, at extra cost pneumatic 34 x 4 fronts and 34 x 5 rears are provided.

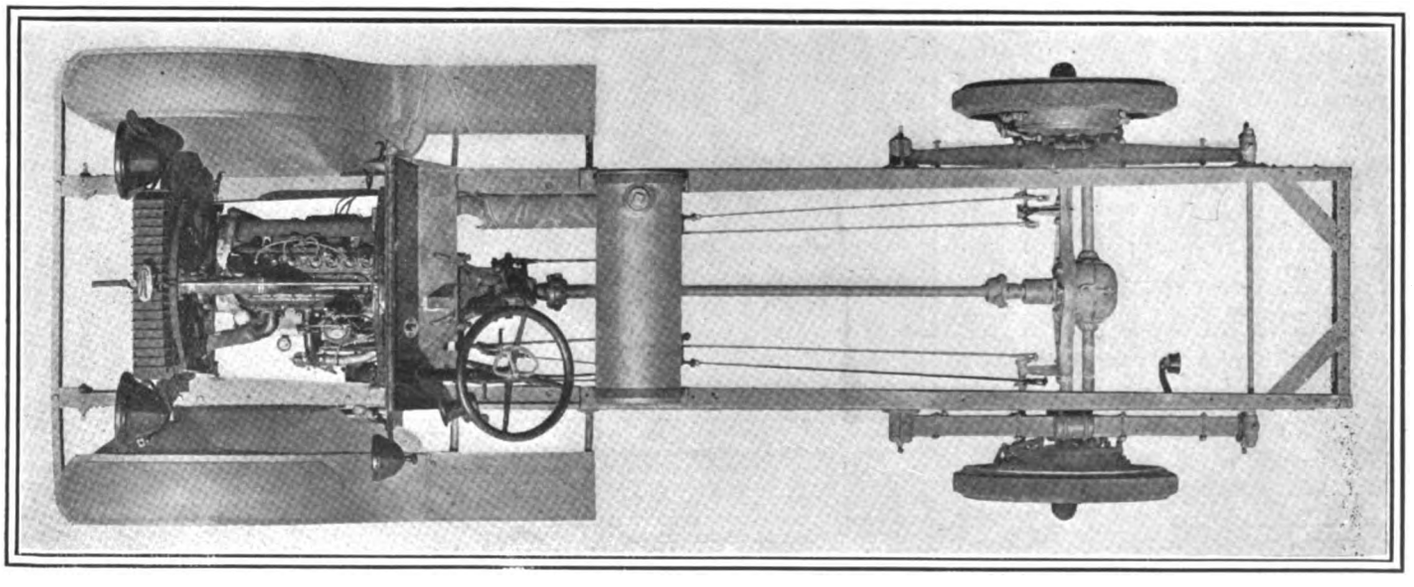
The Jacox steering gear is at the left and the hand levers in the center.



Front and rear-axle views of the new Commerce 1-tonner which employs electric starting and lighting and has a Torbensen internal-gear rear axle



Side view of the Commerce 1-tonner as fitted with a standard type of open express body



Plan chassis view of the new Commerce 1-tonner showing the unit powerplant layout and the Torbensen internal-gear-driven rear axle. Note the flexible frame construction and that both the torque and propulsion are taken through the springs

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Men and Makers



VIM MOTOR TRUCK CO., Philadelphia, Pa., is rushing the work on the new addition to its plant. Two new floors, which were started after the removal of the company last August, will each add about 80,000 sq. ft. to the present structure. This will make a total floor area of 560,000 sq. ft. in the six floors and basement of the building.

Cadillac Auto Truck Co., Cadillac, Mich., has completed the foundation work and the first floor of its new plant. The structure is to be two stories high, 100 x 180 ft., and will be ready for occupancy Nov. 15.

Twin-City Four Wheel Drive Co., St. Paul, Minn., has recently begun the erection of a two-story addition, 120 x 175 ft., to its present factory, which it opened 2 months ago. It is expected the new structure will be completed within 40 days.

Myers Machine Co., Sheboygan, Wis., which was reorganized several months ago for the purchase of the equipment and stock of the Wisconsin Motor Truck Co., Baraboo, Wis., and consolidated the plant with the general machinery works at Sheboygan, is now making regular deliveries of the Wisconsin truck to its dealers. New equipment has been provided for a considerable output, and it is said that the concern is already behind in its orders.

Moreland Motor Truck Co., Los Angeles, Cal., has introduced a new system of inspection at its plant, the main feature of which is the placing of the responsibility of the final inspection on the shoulders of one man. In the past it had been the custom to accept as final the regular inspectors' O. K.'s on all the trucks turned out. In the majority of cases this proved satisfactory. but in rare instances customers were disappointed when some minor troubles developed after they had departed from the service station. Now one man must personally inspect every truck turned out of the Moreland factory and carefully examine every repair job. He must check the reports of the other inspectors, and in any case where there is the slightest deviation from a perfect O. K. he will turn the work back to the service department until it has been made exactly right. The man appointed for this position is R. M. Bowzer, who has been with the Moreland company since it started manufacturing.

Willys-Overland Co., Springfield, Mass., opened one of the largest motor structures in western New England last week. It is a four-story building, thoroughly modern, with sales and service accommodations. It has a frontage of 75 ft. on Chestnut Street and runs back for 300 ft. on Winter Street, the building covering 226 ft.

Studebaker Public Garage in South Bend, Ind., is to be a brick and concrete structure, 100 x 165 ft. It will be erected at 528-536 South Lafayette Street. A building permit calling for a $30,000 structure has recently been issued to E. Burner & Co., who will put up the building.

Packard Motor Car Co., Portland, Me., controlled by Alvan T. Fuller of Boston, Mass., has had John H. McCusker sent on from the Boston office to take charge of the truck sales for the Maine territory. Harry L. Kilkenny, formerly of the Hudson agency at Portsmouth, has also joined the Portland company.

Western Massachusetts Cadillac Co., Springfield, Mass., with headquarters at 521 Bridge Street, has secured the agency for the G. M. C. truck for Hampden, Hampshire and Franklin counties in Massachusetts and part of Windham County, Vt. The company is exhibiting a full line, comprising ¾-, 1½-, 2-, 3½- and 5-ton trucks, at the big dairy show that has just opened at West Springfield.

Fowler Motor Car Co., Springfield, Mass., has just taken the agency for Kiselkar trucks in central Massachusetts.

M. F. Collins Co., Boston, Mass., has taken the agency for Wilson trucks. Salesrooms have been opened at 570 Commonwealth Avenue and a service station at 690 Beacon Street. The company is well known in fire department circles as efficiency engineers, and for some years it has handled a line of fire apparatus at Boston. F. A. Collins is in charge of the agency.

Ideal Auto Mfg. & Sales Co., Fort Wayne, Ind., has secured the agency and distribution of Maxwell vehicles for four counties in northern Indiana—Wells, Adams, Allen and Whitley.

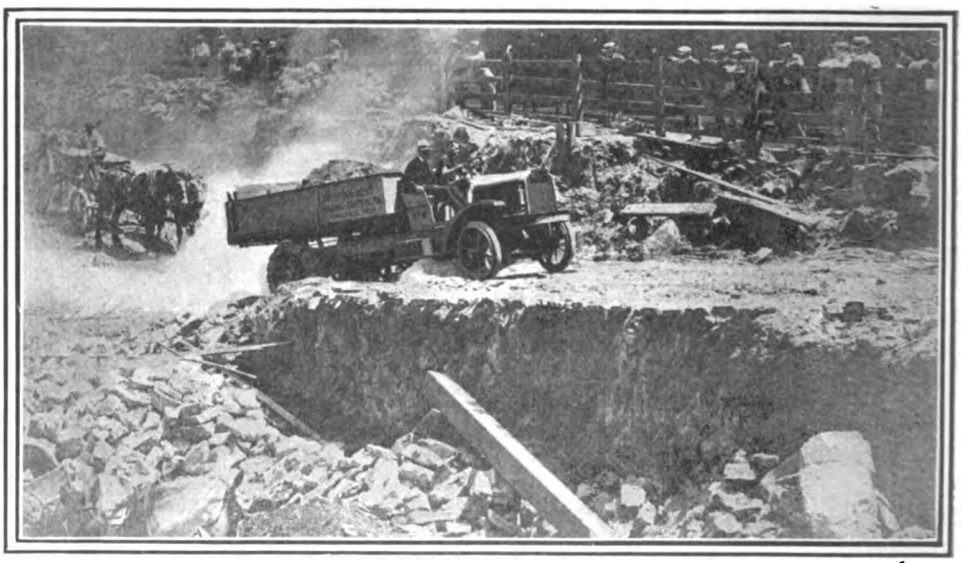
Edward G. Budd Mfg. Co., Philadelphia, Pa., maker of steel motor truck bodies, has just awarded a contract for the electrical equipment of its recent plant additions. The electrical appliances and machinery are estimated to cost $20,000.

Waukesha Motor Co., Waukesha, Wis., plans to increase its capital stock to $1,000,000 to provide necessary funds for the erection of several plant additions, the plans for which have already been completed.

Borg & Beck Co., Moline, Ill., has let the contract for a new building on Fifth Street, adjoining its present plant. The new structure will be 150 x 150 and will be fireproof. It will be devoted exclusively to the manufacture of an improved motor vehicle clutch, a Borg & Beck patent. The clutch has been adopted by a large number of the leading truck and tractor manufacturers, and the demand has been beyond the capacity of the plant, making enlarged quarters necessary. It is planned to place the new building in service about Jan. 1.

Michigan Malleable Foundry Co., St. Joseph, Mich., will add two new buildings to its present plant. One of these will be 100 x 300 ft. and the other 60 x 80 ft.

Cotta Transmission Co., Rockford, Ill., has purchased 100,000 sq. ft. of land at the corner of Eleventh Street and Twenty-third Avenue, upon which a factory of the monitor type will be erected. The present plant is to be abandoned. The change is made necessary by increased business and the necessity for enlarged quarters. The great increase in the demand for trucks with resultant growth in the demand for gearsets, forces



Stedman Bent, of Philadelphia, Pa., the owner of the 5-ton White truck shown above, calculates that it can do the work of nine horse teams in hauling dirt from cellar excavations. It carries three times as much as an ordinary horse team and is able to make three times as many trips. The great money-making possibilities of motor trucks in the contractor's haulage field recently led Mr. Bent to buy fifty White 5-tonners on one order, said to be the largest single purchase of motor trucks ever made by a contractor in this country. The purchase of these trucks has brought Mr. Bent's total White fleet up to sixty-one. He bought his first truck in February, two more in March, one in April, four in May and three in July. The large fleet of trucks are to be used for hauling of any kind, in any line of business, by the day, week or month, or by the yard or ton, and in this way to render the best possible service to any contractor, merchant or manufacturer

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Pontiac, Mich., is 100 years old. On the day of its founding the hardy settlers toted in their belongings on pack mules. Today the city's products are hauled in and out by motor trucks. The vast change in the transportation methods of the last century were vividly illustrated in the centennial by which Pontiac celebrated its 100-year mark. Two long-eared mules, each staggering under a load of a few hundred pounds, led the parade, followed by one of the large G. M. C. 5-ton motor trucks hauling a loaded trailer of equal capacity, or 10 tons in all

expansion. The new plant will be ready Nov. 20 and will have 27,000 sq. ft. of floor space. At present the company is employing 100 men. The new plant will employ twice that number.

Metal Auto Parts Co., South Bend, Ind., manufacturer of metal parts for motor vehicles, will build in Indianapolis, Ind., a new one-story brick factory building to cost $80,000. The new plant will cover about 4 acres of ground and will contain about 100,000 sq. ft. of space. A small building will be erected for an enameling plant that will contain twenty ovens. At the present time about 150 men are employed. In the new plant more than 300 men will be employed.

Fay-Kultgen Foundry Co., St. Joseph, Mich., is planning to double the capacity of its plant by the addition of a new building 80 x 150 ft. Recent orders for the manufacture of motor vehicle parts are crowding the foundry to its greatest capacity.

Brown Co., Syracuse, N. Y., maker of bolts, has just completed installing four new oil-burning furnaces with a capacity of sixteen pots per furnace, or 1200 to 1600 bolts per heat for each furnace. Three heats can be successfully run every 24 hr., or 3600 to 4800 pieces for each furnace in a complete day.

Union Products Co., Rockford, Ill., has recently been formed by A. A. Martin to manufacture motor vehicle accessories. Its first product is the Union piston ring, which is of the non-leak two-part type. It is made under a patent to D. D. Shierk, Rockford, Ill., under date of Aug. 22, 1916. It will be manufactured for all standard sizes of pistons.

Herbert Flint, general sales manager of the J. C. Wilson Co., Detroit, maker of the Wilson 2-ton truck, has returned to Detroit after a 5 weeks' trip through the Eastern States, where he closed contracts with dealers for the New York and New England territories.

C. N. Gillette, formerly traveling sales representative for the Chase Motor Truck Co., Syracuse, N. Y., in the Southern territory, has been transferred to the Chase company's New York City branch.

Leon H. Abbott, formerly manager of the service department of the Chase Motor Truck Co., Syracuse, N. Y., for the past 6½ years, has been promoted to the position of assistant sales manager of the same concern.

W. J. Male has recently been appointed sales manager for the Stewart Motor Corp., Buffalo, N. Y., succeeding George W. Davis, who resigned some time ago.

J. I. Moore, for the past several years identified with the motor truck department of the International Harvester Co., Chicago, maker of the I. H. C. truck, has joined the sales force of the Chase Motor Truck Co., Syracuse, N. Y.

J. D. Niekirk, formerly foreman of the Sommer Motor Co., Bucyrus, Ohio, is now the shop superintendent of the Galion Dynamic Motor Truck Co., Galion, Ohio, maker of electric industrial trucks.

Frederick S. Schaefer, formerly chief of the truck-inspection department of the Packard Motor Car Co., Detroit, and for the past 2 years stationed in Petrograd, Russia, is now in this country and reports that the awakening of Russia has been made possible principally through American-made motor vehicles, particularly motor trucks. According to Mr. Schaefer, Russia's millions of fighting men are reaching the front on American-made motor trucks. The ammunition, foodstuffs, clothing, forage, etc., are also going forward on American motor trucks. It is also more than reasonably sure that a large number of these vehicles will be employed in the handling of Russia's internal commerce after the close of war, so that the American motor truck will have played a large part in Russia's development.

E. F. McConaha has been appointed manager of the New England branch of the Maxwell Motor Sales Corp., Boston, Mass. He succeeds Ralph E. Coburn, recently resigned. Mr. McConaha has been connected with the Maxwell organization for several years, and was formerly a special representative with the retail sales-promotion department, which established branches throughout the country. Before identifying himself with the Maxwell company he had been connected with several of the large motor vehicle makers in Detroit.

John S. Wiese has just been appointed branch manager of the Studebaker Corp., Detroit, succeeding J. O. Hahn, resigned. The branch headquarters, which were previously located in Cleveland, Ohio, have been moved to Buffalo, N. Y. Mr. Wiese was previously manager of the Winton branch in Los Angeles, Cal., and before that was branch manager in the same city for the United States Rubber Co., New York City. Before that he was associated with the B. F. Goodrich Co. at the Akron, Ohio, factories of that concern.

J. O. Hahn, who resigned as branch manager of the Studebaker Corp., Detroit, has become treasurer of the newly-formed Studebaker Sales Co., Toledo, Ohio. The latter concern is a combination of the Blevins Auto Sales Co. in Toledo and Cincinnati, Ohio, and the Davis Motor Car Co. of Cleveland.

Lee J. Eastman, manager of the Philadelphia branch of the Packard Motor Car Co., was elected president by the directors at a recent meeting held in Detroit. He succeeds Edwin B. Jackson, who is now president of the New York branch.

A. C. F. Keleher, a member of the Foss-Hughes organization in Philadelphia, Pa., for the past 4 years, has been added to the list of agents of the Pierce-Arrow Motor Car Co. and has purchased a half-interest in the company's business at Pittsburgh, Pa. Mr. Keleher will be associated with Herman H. May in the Pierce-Arrow agency in that city, the firm being known as the May-Keleher Co. Before entering the motor vehicle business Mr. Keleher was in the Pay Department of the United States Army, having served in the Philippines and Porto Rico. Just before he joined the Foss-Hughes organization in Philadelphia he was assistant sales manager of the Holophane Co., manufacturer of electrical apparatus.

P. W. Mynor, president of the P. W. Mynor Co. at Springfield, Mass., that handles, among other lines, the Kissel-Kar truck, has sold out his interest in the concern and retired. He has not decided what he will do in the future.

E. W. Penton, who is connected with the Service Garage at 122 Fourteenth Avenue, Columbus, Ohio, has taken the central Ohio agency for the General Vehicle Co., maker of the G. V. electric truck.

Albert W. Montgomery, formerly with the Interstate Auto Co., Duluth, Minn.,

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has joined the Sterling Motor Car Co., Tacoma, Wash., and will have charge of the sales of Kisselkar trucks for that concern.

J. B. Riall has been appointed manager of the truck department of the Poertner Motor Car Co., New York City, handler of the Jeffery line of trucks.

J. G. Perrin, chief engineer of the Timken-Detroit Axle Co., Detroit, has tendered his resignation, owing to ill health and other business arrangements. At this writing it is not known whether it has been accepted or as to what new activities Mr. Perrin will take up if it is accepted.

C. W. Hatch, who has been identified for the past 9 years with the sales department of the Perfection Spring Co., Cleveland, Ohio, has been appointed sales manager for the same concern.

The Goodyear Oriental Twins are C. H. Williams, manager of the Chicago branch of the Goodyear Tire & Rubber Co., Akron, Ohio, and R. A. McCorkle, manager of the manufacturers' division of the motor truck tire department. These two men are probably the only ones in the Goodyear organization familiar and conversant with the Chinese and Japanese languages. It may be said that they complete the circle of Goodyear linguists, and it is thought that no language in the world can get through the Goodyear organization without being understood by someone in it. McCorkle lived in far Nippon for 5 years, and during that time became almost a Japanese. Mr. Williams got his first start in the mastering of the Chinese language as the manager of a telephone exchange in San Francisco's Chinatown.

J. C. Weston will remain with the United States Tire Co., New York City, instead of joining the Mitchell Motors Co., Racine, Wis., in the capacity of vice-president in charge of sales. Mr. Weston will assume the newly-created position of director of sales, thus abolishing the post of sales manager formerly held by him.

O. S. Tweedy, of the United States Tire Co., New York City, has become general branch sales manager of the concern and will have direct charge of all the branches.

Officers of the Union Products Co., Rockford, Ill., recently formed for the manufacture of motor vehicle accessories, are as follows: President and general manager, M. A. Martin, formerly vice-president and sales manager of the Burd High Compression Ring Co., Rockford, Ill.; chief engineer, W. E. Williams, consulting engineer of the American Steel foundries; vice-president, M. R. Harned, and secretary, H. F. Norris.

W. M. Tompkins is the new Philadelphia, Pa., representative of the Ward Leonard Electric Co., Mount Vernon, N. Y. He has opened headquarters at 4813 Haverford Avenue, in that city.

W. I. Ballentine, formerly general superintendent of the Indianapolis, Ind., works of the Link-Belt Co., has resigned to become works manager of the Chain Belt Co., Milwaukee, Wis.

The Overland Bowling League began its 1916-17 season recently with sixty-four clubs. The organization, known as one of the largest of its kind, had forty-eight clubs last year, so that it has increased one-third in size for the coming season. The present sixty-four clubs have been divided into two thirty-two-team leagues. They will roll their games at the Willys-Overland plant at Toledo every night of the week except Sunday, with two additional shifts on Saturday afternoons. The season will be continuous until April 20, 1917. It is anticipated that prize money amounting to $4,200 will be competed for by the sixty-four clubs, each team in the league being sure of some sort of prize at the end of the year. The prize money is derived from the entrance fees, from the proceeds derived from the advertising in the book containing the schedule and from the money paid in by spectators of the league contests. The upkeep of the alleys, including the salaries of an alley manager and the pin boys, is borne by the Willys-Overland company.

Columbus Automobile Trade Association, which is a merger of the former dealers' and garagemen's organization, is giving special attention to commercial vehicles. The organization was effected recently with a membership of 175. The activities of the organization will be carried on by four divisions, known as dealers in passenger cars, motor trucks, tires and accessories, and garage owners and repair shops. In the board of directors, which consists of twelve members, each of the divisions is represented by three members. H. J. Schwartz is president; J. P. Gordon, vice-president; Joseph Bernhard, secretary. H. K. Dobson, Frank Kaiser, C. G. McClure, Oscar Lear, Charles Justus, R. O. Williams, R. L. Hayes, Robert McClure and A. B. Coates are members of the board of directors.

Outing of the Garford Syndicate Club, an organization of men representing the various companies from which the Garford Motor Truck Co., Lima, Ohio, buys material for the manufacture of its trucks, was held at Indian Lake, 33 miles from Lima, on Sunday, Sept. 10. It was attended by more than 150 members. The organization was formed by W. P. Culver of the Perfection Spring Co. Before the close of the outing the officers of the club were elected for the coming year, as follows: J. T. Kennedy, president; M. C. Newton, first vice-president; George L. Bitting, second vice-president; William C. Little, treasurer; H. E. Burke, secretary; L. L. Kahn, sergeant-at-arms, and W. P. Culver, auditor.

New Departure Barbecue, held on Saturday, Sept. 30, was attended by 2700 employees of the New Departure Mfg. Co., Bristol, Conn. The company furnished everything for the day and the men were enthusiastic in their commendation of the completeness with which President De Witt Page carried on the features of the big holiday. Eighty spring lambs were stretched on skewers and placed over a trench 328 ft. long filled with burning charcoal. The meat was grilled in this manner over 6 hr., and then served hot to the men at tables in the grove. Nine thousand ears of corn, or the product of a 5-acre lot, were furnished; but even this immense quantity was not enough, and 2000 cans of corn had to be added. The corn was cut from the ears and fried in large pans over wood fires beside the barbecue pits. Thirty bushels of potatoes were boiled in large vats, and the bakers throughout the Bristol section were kept busy the night before making old-fashioned New England pumpkin pies. A miniature ice house erected on the ground kept the beverages served cold. Following the dinner a program of athletic sports was arranged.

Staff Organization in the United Motors Corp. is to be shortly instituted for the consideration of the engineering, purchasing, sales, advertising and general executive matters which confront the management of the five parts concerns which form the affiliated organization. The purpose of the formation of the new departments is to secure the benefit of the experience of each of the five companies. The engineering department, for example, will comprise the engineering staffs of all five companies. They will meet at frequent intervals to consider the particular problems which may face one of the concerns, and will be able to decide which is the best course to pursue. The engineering department will similarly meet to discuss any engineering problems which may arise and which may have been solved by one of the other concerns before the formation of the United Motors organization. It is expected that these various departments will be formed and will hold their first meetings some time before Nov. 1, 1916.

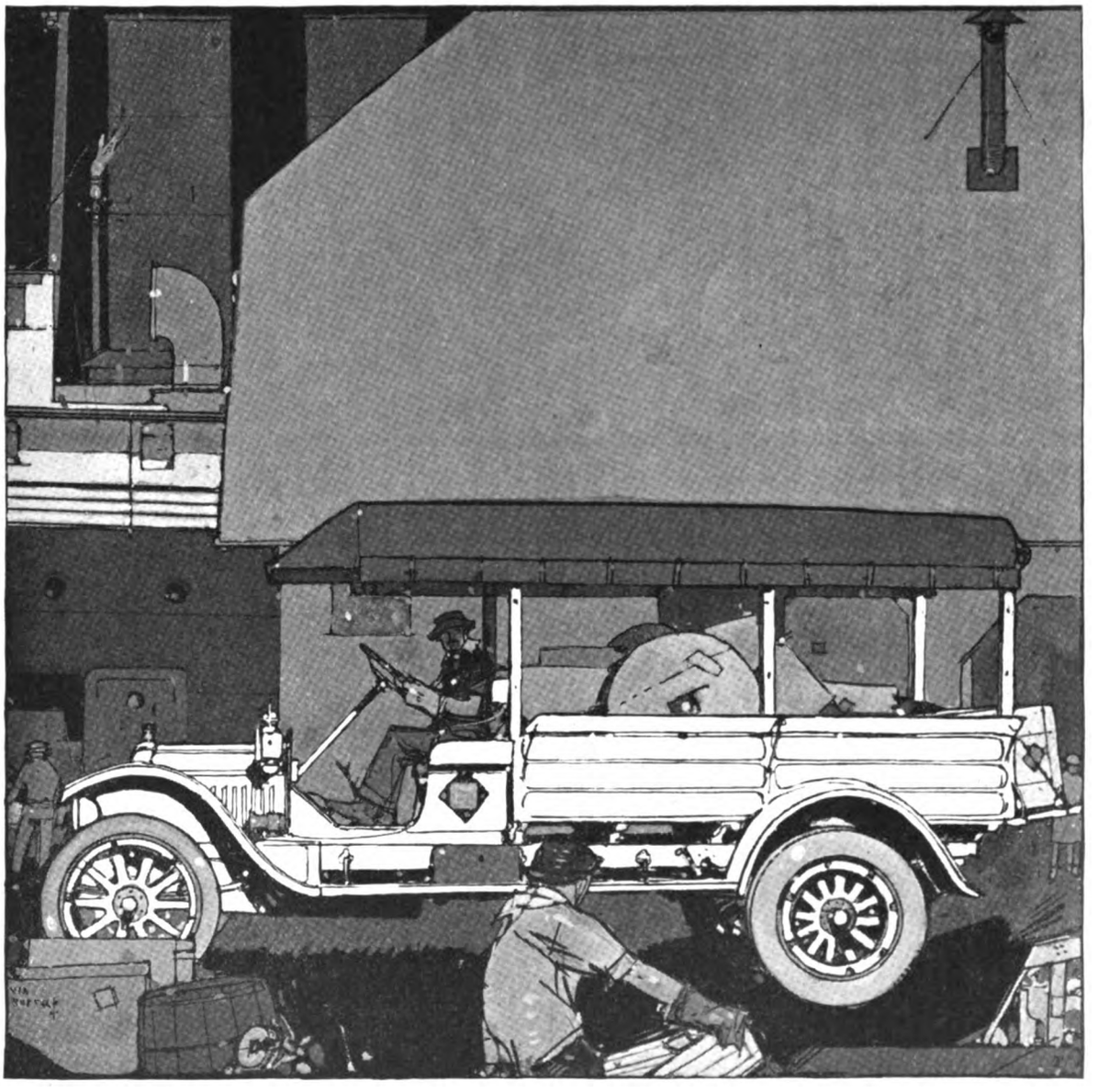
A Reo Welfare Department is to be formed by the Reo Motor Car Co., Lansing, Mich., for the purpose of enabling any of its 5000 employees who have real estate and personal property to list these in the clearing house of the department and have the latter take care of any additional sales or purchases the employees desire to make.

The Goodyear Refund-Purchase-Price Scheme on its S. V. solid tires has now been found to have been based not entirely upon the confidence of the Goodyear Tire & Rubber Co. in its product, but upon the record of 5000 test tires which had been previously worn out in service. It is said that at the termination of the offer only a few of the many hundreds of tires sold had failed to give the guaranteed mileage of 7000. Many of the tires are still in service although well over the 7000-mile mark. Several of the tires show an average of more than 13,000 miles, or nearly double the written mileage guarantee.

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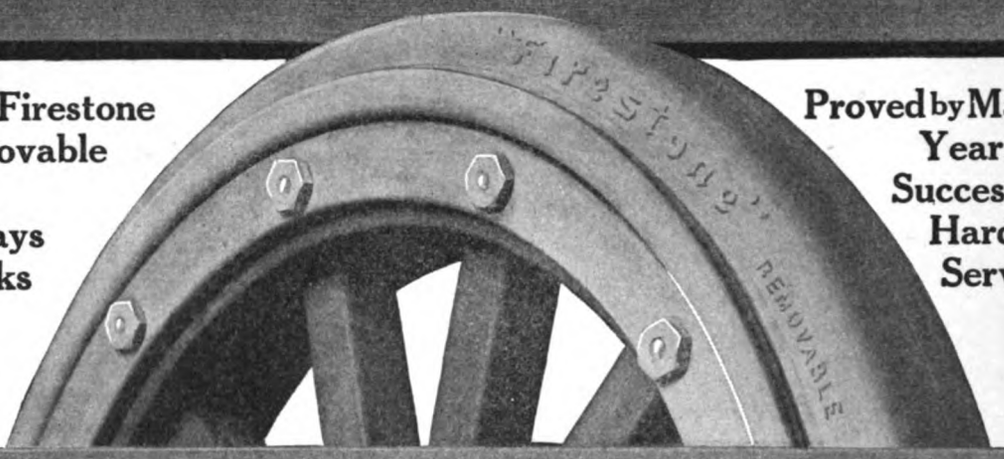
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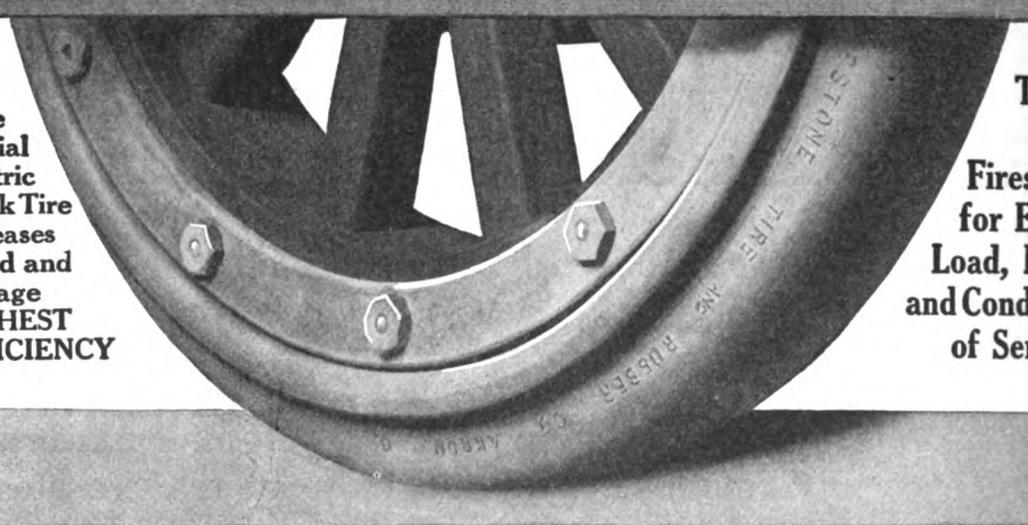
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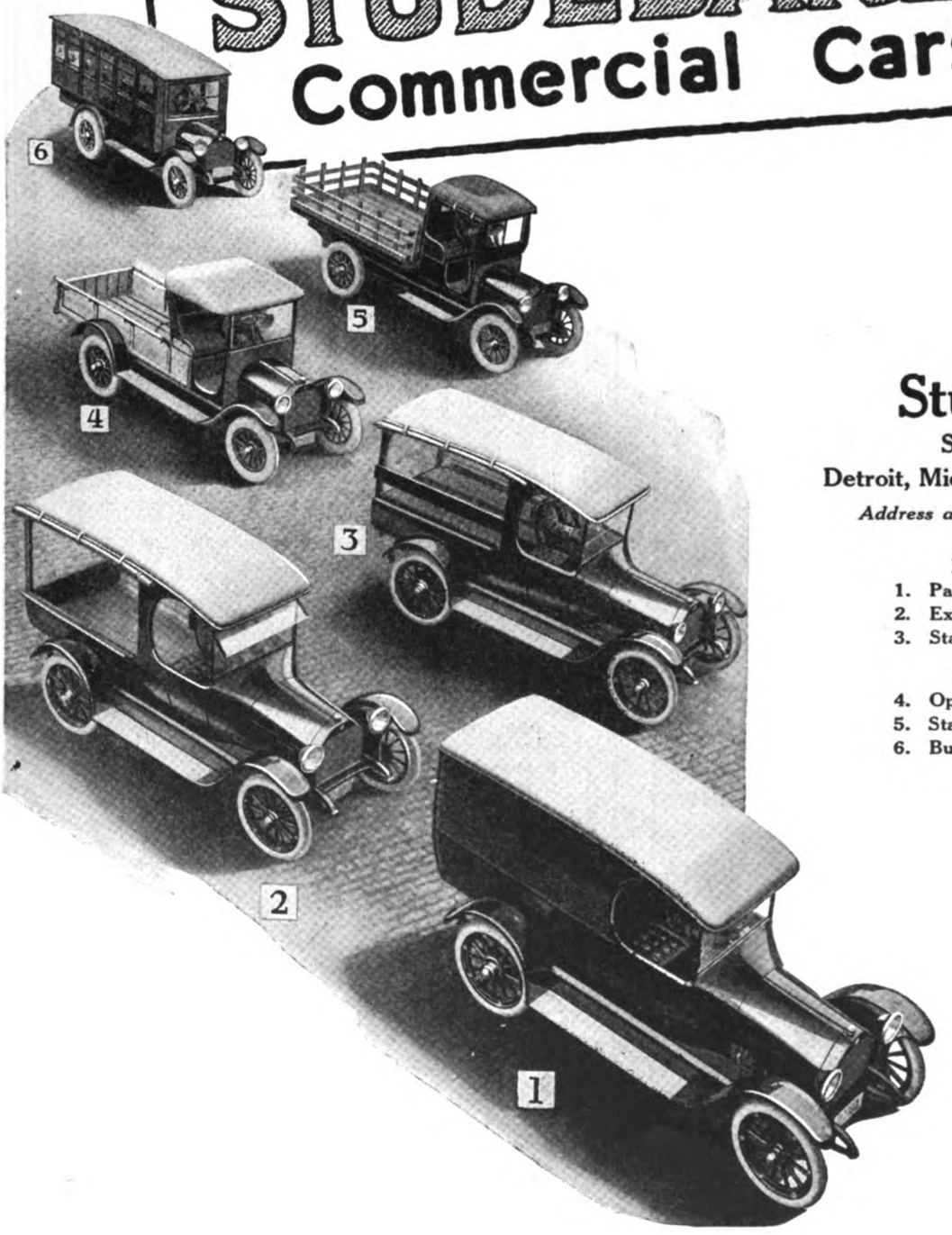
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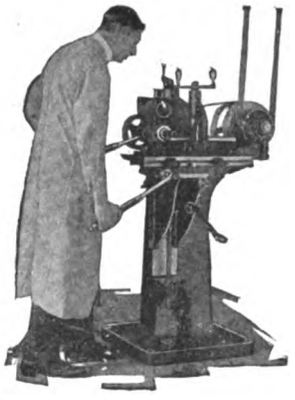
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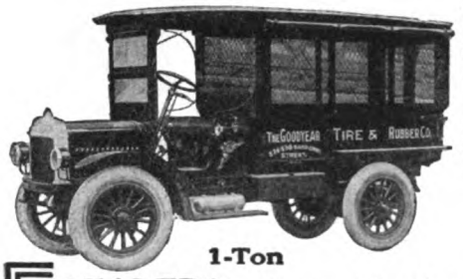
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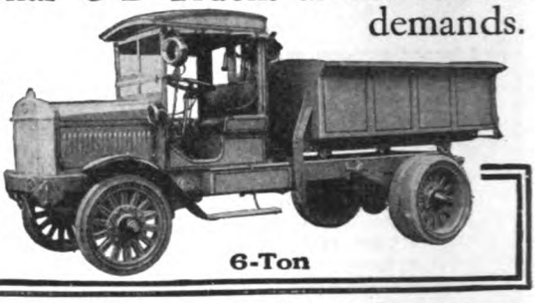


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Statement of the Ownership, Management, Circulation, Etc., Required by the Act of Congress of August 24, 1912, of The Commercial Vehicle, published semi-monthly, at New York, N. Y., for Oct. 1, 1916.

State of New York, County of New York, ss.: Before me, a Notary Public in and for the State and county aforesaid, personally appeared E. M. Corey, who, having been duly sworn according to law, deposes and says that he is the Treasurer of The Commercial Vehicle, Inc., Publishers of The Commercial Vehicle, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are:

Publisher, The Commercial Vehicle, Inc., 239 West 39th St., New York.
Editor, M. C. Horine, 239 West 39th St., New York.
Managing Editor, David Beecroft, 239 West 39th St., New York.
Business Manager, C. W. Blackman, Flushing, N. Y.

2. That the owners are: The Commercial Vehicle, Inc., 239 West 39th St., New York.

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4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

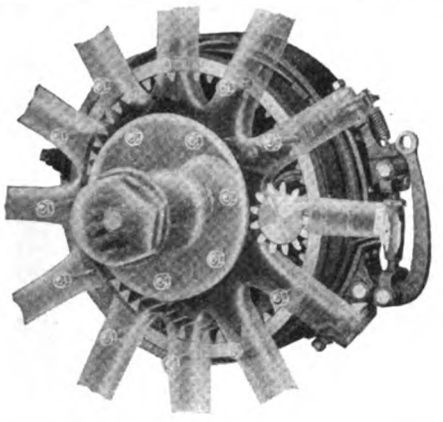
The Commercial Vehicle, Inc.
E. M. Corey, Treas.

Sworn to and subscribed bfeore me this 29th day of September, 1916. Thornton W. Snead, Notary Public 269, New York County, N. Y.

Sworn to and subscribed before me this 29 th day of September, 1916.
T. W. Snead, 269.

[Seal] (My commission expires March 31st, 1917.)

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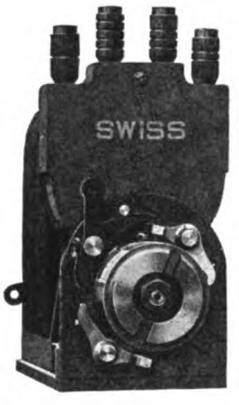


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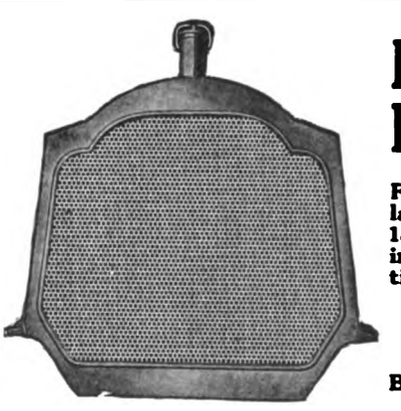
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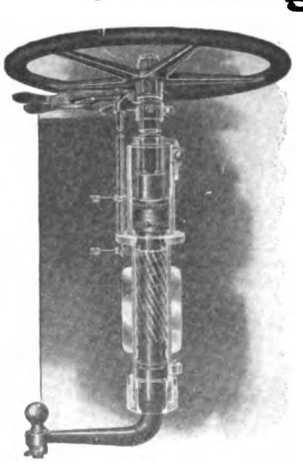
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"If it's made of felt, ask Booth"

Write—Wire or Phone

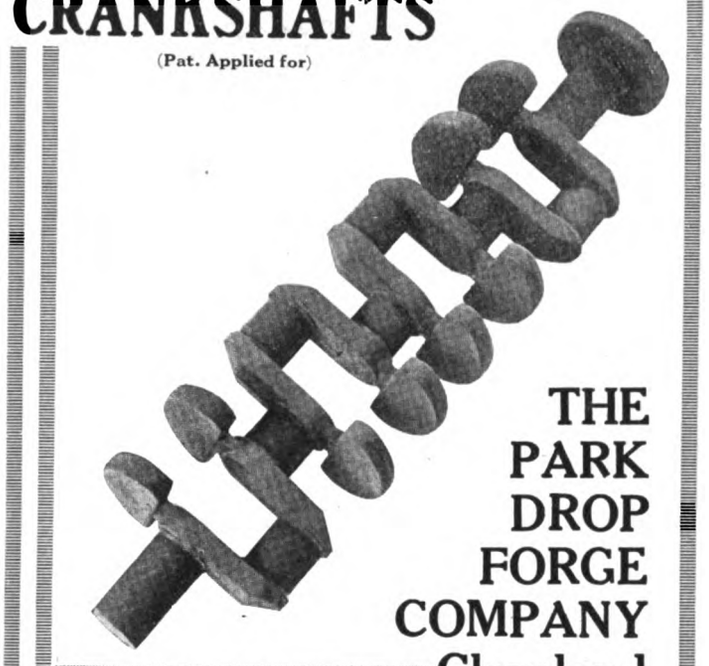
The Booth Felt Co., Inc.
440-450 Nineteenth St., Brooklyn, N. Y.
116-118 South Fifth Ave., Chicago, Ill

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PARK

COUNTERBALANCED CRANKSHAFTS

(Pat. Applied for)



THE PARK DROP FORGE COMPANY
Cleveland

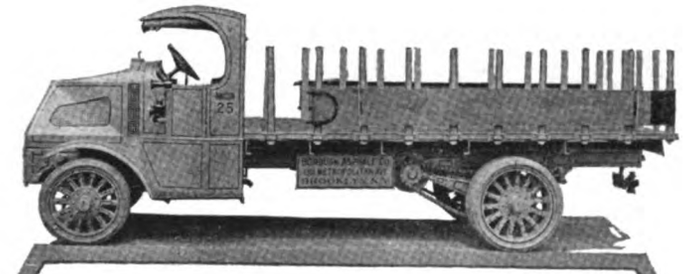
GMC
GENERAL MOTORS COMPANY
TRUCKS

This trade mark stands for a complete line of trucks *built in worm and chain drive* to meet the varied demands of city and country work—a truck to fit your business.

Send for catalogues today

GENERAL MOTORS TRUCK COMPANY
One of the Units of General Motors Co.
Pontiac, Michigan

Branches and Distributors in principal cities (84)



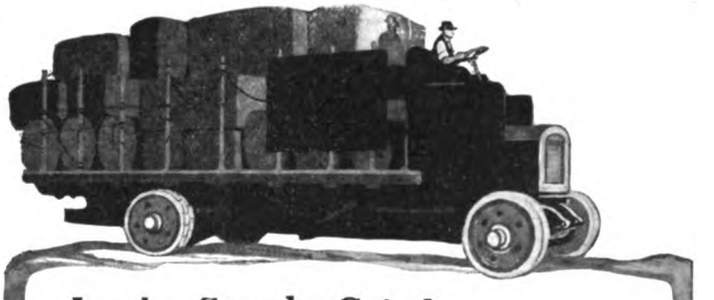
NEW *Mack* MODEL

The Mack "AC," illustrated above, is the latest addition to our extensive line of motor trucks.

The demand for this model has been so instantaneous and consistent that we have been unable to supply demonstration trucks for all of our representatives. Despite this fact, our salesmen have had no difficulty in taking *new* orders and *repeat* orders from specifications and blue-print drawings.

Doesn't this satisfactorily demonstrate Mack superiority?

International Motor Company
64th St. and West End Avenue, New York



In the Steady Grind of Heavy Work—

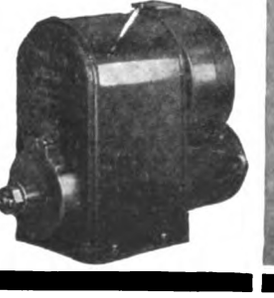
you need power—steady, reliable, unfailing power.

The

EISEMANN
MAGNETO

is known throughout the land for its Hot, Sure Spark at all speeds (even the lowest); Easy Starting; Simple, Sturdy Construction.

Proof: 108 Manufacturers of Trucks, Tractors, Pleasure Cars, etc., use nothing but Eisemann. Pretty good evidence!



THE EISEMANN MAGNETO CO.
Sales and General Offices
32d-33d Sts., Brooklyn, N. Y.
Indianapolis, Ind. 415-417 N. Capitol Ave.
Detroit, Mich. 802 Woodward Ave.

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MACCAR

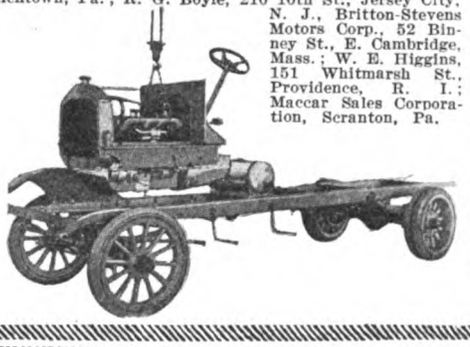
TRADE MARK

SUBSTITUTE A NEW POWER PLANT

Motor trouble with a MACCAR TRUCK is eliminated. When you have trouble you simply substitute a new power plant in 30 minutes—just like getting a watch fixed! The motor, clutch, transmission, radiator, pump, magneto, carburetor, dash and toe boards, brake and foot pedals, steering gear and all spark and throttle controls, are assembled dust-proof, in one cradle and as a Unit mounted into the frame. Simply remove six nuts and the entire unit can be removed and another substituted. Dealers will be interested in the possibilities of the MACCAR TRUCK. Territory is being allotted now. Write for details.

MACCAR TRUCK CO.
SCRANTON, PA
Distributors:

Pitts Motor Car R & S Corp., 540 Atlantic Ave., Brooklyn, N. Y.; Maccar Sales Co., 2116 Market St., Philadelphia, Pa.; Bee Automobile Co., 15 N. Church St., Allentown, Pa.; R. G. Boyle, 210 10th St., Jersey City, N. J., Britton-Stevens Motors Corp., 52 Binney St., E. Cambridge, Mass.; W. E. Higgins, 151 Whitmarsh St., Providence, R. I.; Maccar Sales Corporation, Scranton, Pa.



"Little Giant"



THE POWER-BRED Truck

MECHANICAL power is bred into the Little Giant Trucks of today—just as strength and endurance were bred into the Percherons of the past. The Little Giant is lively, responsive, like a fine-spirited horse—yet, like a young Mogul Locomotive, it is dependable twenty-four hours in twenty-four. Thousands of Little Giant owners proudly boast—"it never had a tow-rope on it yet."

THE "LITTLE GIANT" LINE INCLUDES

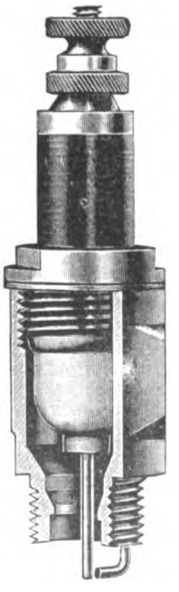
Model 15—1-ton Worm Drive
Model H—1-ton Chain Drive
Model H—1½-ton Chain Drive
Model 16—2-ton Worm Drive
Special Bodies for Every Purpose

Agents wanted for desirable territory

CHICAGO PNEUMATIC TOOL COMPANY
1085 Fisher Bldg. CHICAGO
52 Vanderbilt Ave. NEW YORK
Branches and Service Stations Everywhere

SOOTLESS
SPARK PLUGS

THIS PLUG increases the protection on the engine end of the plug by adding a porcelain cap so arranged and enclosed that it is protected against breakage, and yet gives plenty of air space between the porcelain (within the firing chamber) and the outer brass shell—this renders the chance of short circuiting through carbon formation exceedingly remote. The plug is so constructed that the high pressure due to compression tends to tighten rather than to loosen it. Being practically oil and soot proof, it is especially adapted for use in air cooled engines that use a large amount of lubricating oil.



Specials for Ford, Buick, Overland.
Write for Circular

Manufactured by
The Oakes & Dow Company 17 CHARDON STREET BOSTON, MASS.

—Sheldon Springs—

Designing a truck presents no nicer problem than that of providing it with springs.

No concern in the world is as well prepared to solve this problem—none with the amount of experience—none with the varied experience—none with the facilities and equipment, either human or mechanical, that the Sheldon Axle and Spring Co. offers.

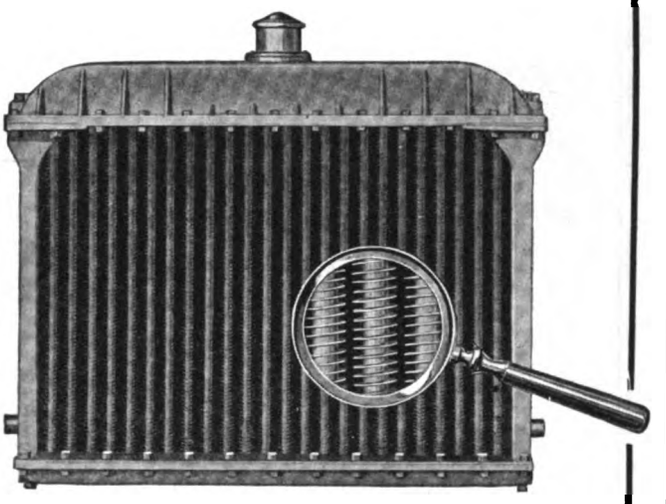
Collectively—these facts are the reason why the service Sheldon Springs will give is a known quantity and a guaranteed quantity.

SHELDON AXLE AND SPRING COMPANY
Wilkes-Barre, Pa.

Makers of Springs and Axles for Heavy Duty Service for more than 50 years.
Chicago: 122 S. Michigan Blvd. San Francisco: 444 Market St.
Detroit: 1215 Woodward Ave.

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Seamless Copper Helical Tube Cooling Sections



Are Guaranteed for the Life of the Motor on Which They are Installed

Helical Tube Construction is Accepted as the Best by the Leading Truck Makers of America

Manufactured only by

ROME-TURNEY RADIATOR CO.
ROME, NEW YORK

SELDEN TRUCKS · SELDEN · IN-BUILT QUALITY

SELDEN TRUCKS

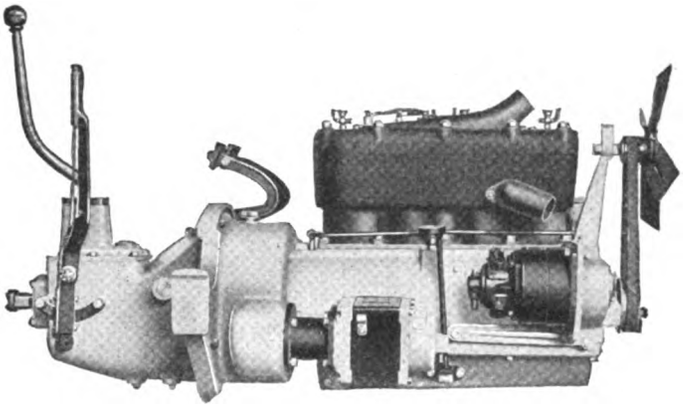
Dealers can afford to wait for our new announcement and attractive selling proposition.

A full line of Commercial Vehicles from a 1500 lb. Delivery Car to a 3½ ton Truck.

All Ready by September

SELDEN TRUCK SALES CO.
Rochester, N. Y.

G·B&S motors



Four Cyls. 3¾ x 4¼—22½ H.P. Three Bearings.

New Chain Adjustment

By a very simple but absolutely certain method the chains on the G B & S motor may quickly be taken up. This one feature indicates the continuous process of refinement that is possible in a factory which devotes its energies exclusively to the production or one type and one size of motor.

This motor has the power, the stamina and the quality that makes it supremely satisfactory in motor truck service. Write.

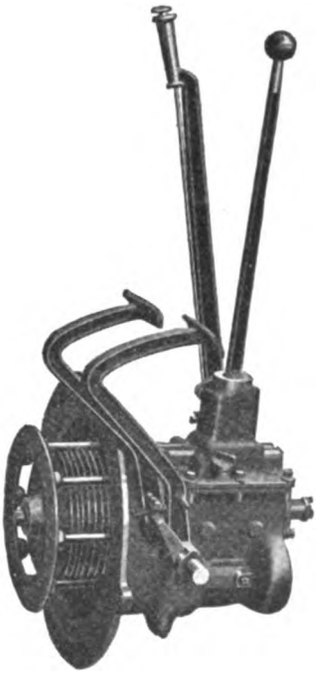
GOLDEN, BELKNAP & SWARTZ COMPANY
DETROIT, MICHIGAN

FULLER
Unit Power TRANSMISSIONS

Model "T U" ¾-1 Ton

Model "T U 2" 1½-2 Ton 4 Sizes

Particulars sent on request



FULLER & SONS MFG. CO.
Kalamazoo, Mich.

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1-Ton to 5-Ton Capacity

Service Worm Drive TRUCKS

Complete Line for Every Commercial Need

Service Motor Trucks are built especially for hard, steady service—to stand up under all reasonable loads, and travel all roads.

Many years' practical experience in building motor trucks exclusively enables us to produce a truck that will stand the test of time in actual use under all conditions.

Every Service unit is standardized—the best made—Buda Motor—Timken Axles—Eisemann Magneto—Long's Radiator — Brown-Lipe Transmission — Ross Steering Gear, etc. In addition every unit is oversized —20% above standard—giving more strength, more power and more flexibility than needed.

Write for Catalog

Service Motor Truck Co.
101 Grand Street Wabash, Ind.

WANTED

A big calibre, forward-looking man to serve a going truck concern located in the Middle West

In the Capacity of President

Executive ability, good business sense, commanding personality imperative. Experience in the truck or an allied business requisite.

Assumption now or later of a part interest in the company optional.

Concern has been producing trucks for 1 year. Not a big concern, but a concern of big possibilities with an excellent reputation. Output last year 60 trucks. Anticipated production for 1917 1,000 trucks.

Send full particulars—age, previous experience, salary expected, photograph, etc., to

BOX A 47

COMMERCIAL VEHICLE
239 West 39th St., New York City

SEVENTH EDITION! ENTIRELY REWRITTEN!

The Gas Engine Handbook

By
E. W. ROBERTS

FOR twelve years this has been the most popular book on gas and gasoline engine design. It has been the only book of popular price and convenient size giving authoritative formulas for the design of engines of this type. Hundreds of successful engines have been designed from its guidance and thousands of gas engine designers have used it for constant study and reference.

For over three years the author has been working on this new edition. Every drawing has been made anew. The matter has been completely rewritten to include gas engine design up to the last minute. Very little change has been required in the formulas, except where new materials, higher speeds, etc., have changed conditions.

The size page has been increased to 4½ x 7½, the number of pages to 300. There is practically double the amount of reading matter, and more than double the amount of specially made illustrations over previous editions.

OVER 300 PAGES 4½ x 7½ OVER 80 DRAWINGS
LIMP LEATHER POCKET SIZE

Price $2.00, Postpaid

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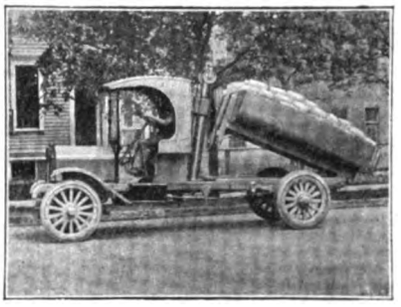
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Stegeman

SIX-CYLINDER
SELF-STARTER

WORM-DRIVE

TRUCKS



The most for your money—that's what we offer. A 6-cylinder Motor, Electric-Starter and Electric-Lights are furnished on our truck without extra charge. On any other machine they would cost $300 extra.

Ours is not the cheapest truck on the market, but it is certainly a low-priced line, quality considered.

WE WANT RELIABLE AGENTS

STEGEMAN MOTOR CAR CO.
Milwaukee, Wisconsin

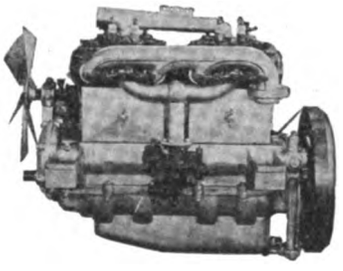
M&S DIFFERENTIAL

THE success of the M & S on the Jeffery Quad and the overwhelming evidence of severest tests long since established "the differenthal that pulls both wheels" as the ideal one for commercial motor vehicles.

Write for interview or send in your specifications.

M & S GEAR COMPANY

166 Lycaste Street
DETROIT



Beaver Motors Make Their Way By The Way They Are Made

BEAVER MOTORS are made by truck motor specialists. The concentrated experience of engineers of international reputation is embodied in their construction.

BEAVER TRUCK MOTORS are made by men who make nothing but motors—who, by doing the same thing over and over have become masters in perfection. That is why we can make truck motors better, quicker, and at less cost than the truck manufacturer himself.

We make truck motors of all sizes, for all requirements. No matter whether you are building a 1,500 pound light delivery wagon or a 5-ton truck, we can meet your demands for power, economy and dependability.

Do not determine on a motor for your truck till you have sent us your specifications

BEAVER MFG. COMPANY
Milwaukee Wisconsin



Truck Tire Efficiency

Our new, secret process compound, vulcanized under a pressure of 1,600,000 pounds (almost four times the pressure used to vulcanize ordinary truck tires) has more vitality, rugged strength and durability than any other compound manufactured.

For this reason, United States Solid Truck Tires are the strongest and most durable now on the market.

United States Tire Company
1790 Broadway, New York City

US
UNITED STATES RUBBER COMPANY
RUBBER SYSTEM
AND ASSOCIATED COMPANIES

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PERFECT simplicity of operation is ONE reason for WOOD hoist supremacy. There are, very naturally, others.



NINETY per cent. of the truck makers in this country list WOOD bodies as standard equipment — now *why?*

Talk it over with your dealer today

WOOD HYDRAULIC HOIST AND BODY CO.
DETROIT

WOOD HOISTS
WOOD BODIES

Garford

MOTOR TRUCKS

Garford Trucks range from one ton to six tons in capacity.

They are designed and built by men who have spent their lives in the study of motor trucks.

They are backed by one of the strongest organizations in the industry.

Bodies are provided to meet all requirements.

Write for catalog. Please address Dept. 103

The Garford Motor Truck Co., Lima, O.

DON'T

throw your old bearings away just because they are worn or broken.

We regrind the raceways (without drawing the temper) insert new balls and retainer AT about one-fifth the cost of a new bearing.

Any broken or worn bearing can be exchanged at any of our service stations, for reground bearings of any type or make, which are guaranteed equal to new.

These stations also carry complete stocks of New Single Row Annular, Thrust, NEW DOUBLE Row and Radax Bearings.

Write for Catalogue "U" and further information

Ahlberg Bearing Company
2636 Michigan Avenue Chicago, Ill.

BRANCHES

New York, 1790 Broadway — Cleveland, 1841 Euclid Ave.
Boston, 93 Massachusetts Ave. — St. Louis, 2831 Locust St.
Detroit, 790 Woodward Ave. — Los Angeles, 325 W. Pico St.
Minneapolis, 926 Marquette Ave.

Wisconsin
CONSISTENT Motors

Write for specifications of different sizes and types for pleasure cars, trucks and tractors.

Wisconsin Motor Mfg. Co.
Sta. A Dept. 319 Milwaukee, Wis.

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Krebs

"The Truck That Thinks"

The ideal commercial truck possesses four essentials — Simplicity — Low Maintenance Cost—High Efficiency and Absolute Dependability—That's the KREBS.

It is powerful, economical and needs no mechanic to drive it. The driver has nothing to do but steer.

The KREBS Automatic Governor positively keeps the motor at a certain speed and is assurance against the results of reckless driving.

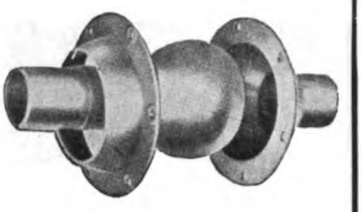
Continental Motor, Timken Axles, Special economical KREBS Carburetor, Timken-Brown Worm Drive — are a few of the important essentials.

In ¾, 1, 2, 3, and 3½ ton capacities with bodies for any business.

Send for catalog—it will show you why you need the KREBS —the most efficient truck in the world.

The Krebs Commercial Car Co.
CLYDE, OHIO, U. S. A.

BOSSERT

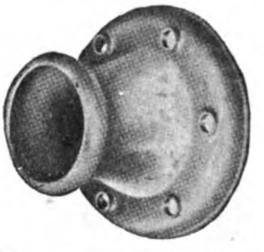


In the most perfect plant that brains, money and experience could devise, we have the men and equipment to produce pressed steel parts in any quantity on comparatively short notice.

We make more than 200 pressed steel parts and you can make your vehicles lighter and at lower cost, without sacrificing strength if you use *pressed steel* spring hangers, running boards, brake drums, etc., instead of malleable iron, steel castings and drop forgings.

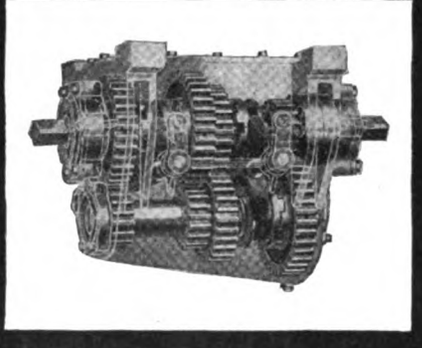
"THE BOSSERT WAY"

stands for the prompt delivery of your order filled in accordance with every item of the specifications.



The Bossert Co.
UTICA
N. Y.

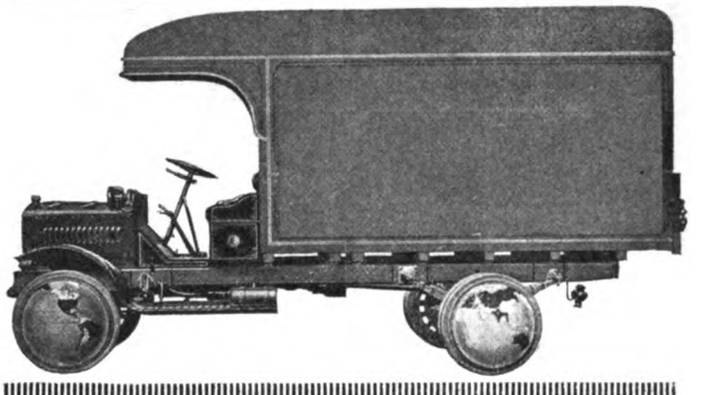
COTTA TRANSMISSIONS



All Gears Always in Mesh

An Assurance of Dependable Service

The Cotta Transmission Co.
Rockford, Ill.



WICHITA TRUCKS

Dependability Plus Extensive Service

ARE YOU THE DEALER

who can put into your salesmanship WICHITA Energy and Spirit and back up your selling accomplishments with WICHITA Service?

If you are such a dealer, we have an interesting selling plan that you will not want to miss considering.

The faithful co-operation of our factory organization will give you encouraging help.

We want live dealers NOW—Men who will interest concerns in our heavy-duty trucks, and then to not let up on them until they sell them.

Request us to immediately submit our plans.

WICHITA FALLS MOTOR COMPANY
Arthur Boulevard, Wichita Falls, Texas

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Be sure of your mileage records

What's the use of keeping mileage records at all, unless you are perfectly sure they are accurate and that they won't be interrupted even by an accident to your truck?

Why not make sure of your mileage records by equipping your truck with the

DREADNOUGHT *Indestructible* Hub Odometer

TRADE-MARK

It's the only hub odometer that's guaranteed indestructible even in collision. If you break it or knock it off, we'll give you a new one free. It can't be tampered with without detection. It's easy to read—figures always right-side up. They can't be hidden by grease or dust. The Dreadnought is the most reliable instrument for recording mileage so that you can eliminate waste.

Write for our free booklet.

It also describes the Recordograf, an accurate tape-recording device which shows time truck is standing, time going, distance traveled and speed at all times.

AMERICAN TAXIMETER COMPANY

Mfrs. of Jones and Popp Taximeters

1765 Broadway, New York City

Service Stations in the following cities:

Philadelphia Washington Pittsburgh St. Louis Boston Chicago New Orleans Detroit Seattle San Francisco



The Star Union Brewing Co., of Peru, Ill., is duplicating—

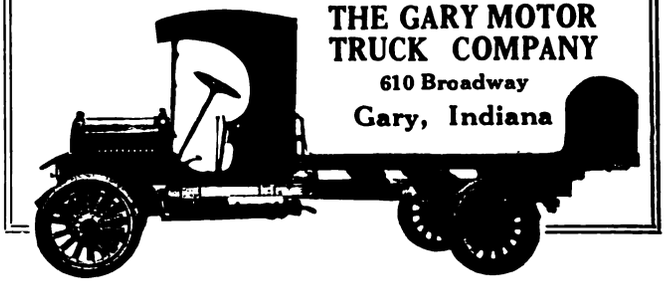
The Worm Drive GARY TRUCK

—now on duty in Peru, for its Peoria branch.

It's the same story we've had to tell ever since GARY Trucks first became established in the field—50% of our business is repeat orders from GARY owners—the best recommendation for Gary service.
Every refinement known to increase efficiency is incorporated in the GARY Truck, by expert workmen.
The result is 4 GARY models, 4 capacities at 4 prices that are right—ready to handle any load you want to move—and to give satisfaction that will make you come back for more.
Try one GARY in service with any assortment of best known trucks. Your fleet will eventually be a GARY fleet.
Dealers—Reorders and generous new business make GARY the logical truck for dealers.

Write or wire for details

THE GARY MOTOR TRUCK COMPANY
610 Broadway
Gary, Indiana



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NORTH AMERICAN MOTORS

4-⅝ in. x 6 in.—45 H. P.—1200 R. P. M.

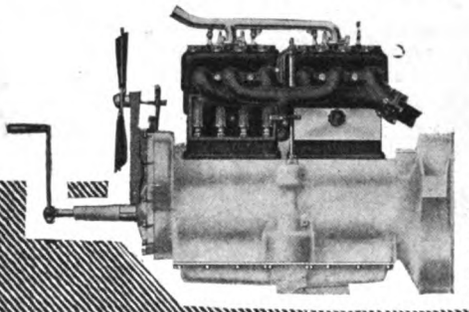
Expressly Designed to Take Care of the Most Exacting Conditions in Truck Service

Model N is a Long-Stroke Motor with a Tenacious Pulling Power—the very essential demanded by successful builders of motor trucks.

Rich with such features as Timing Shaft driven by Silent Chain, Speed Governor, Valves all on one side, enclosed and easily accessible by removable plates, and intake and exhaust manifolds on one side, with magneto on opposite side, removed from heat of exhaust manifold.

There are other good reasons why you should use the North American Motor. Let us tell you about them and quote prices.

North American Motor Co., Pottstown, Pa.





WHAT CAN HE DO?

When the inevitable emergency arrives, and the brake lining won't grip, all the driver can do is trust to luck.

And luck is all you can trust to, if you have loosely woven brake lining which is friction-surfaced only, and which becomes treacherous as soon as the surface is worn smooth.

Thermoid HYDRAULIC COMPRESSED Brake Lining-100%

Is ready for every emergency; its grip is mighty, sure and instantaneous; it has more than sufficient friction (gripping power) even when worn paper thin. The life of a truck, the lives of human beings, often depend upon brake lining—insist that yours be Thermoid.

OUR GUARANTEE

Thermoid Brake Lining is absolutely guaranteed to give more satisfactory results and to outwear any other lining manufactured. Not affected by heat, oil, water, gasoline or dirt.

Thermoid will make good or we will

THERMOID RUBBER COMPANY
TRENTON, N. J.

ACME Worm Drive Trucks are sales-makers, sales clinchers. They create and close business!



2-Ton Worm Drive ACME Chassis equipped, $2100
1-Ton Worm Drive ACME Chassis equipped, $1500

ACME THE TRUCK OF PROVED UNITS

A Fast-Sales Opportunity For Live Dealers!

And a **BIG-PROFITS** opportunity! Here is a truck line to meet the majority demand—trucks of right capacities and oversize dimensions—impressive-looking, sure-service **worm drive** trucks. Show **ACME** Trucks and you get "the signature on the dotted line." They are **easy** to sell. Fifteen famous features place their efficiency beyond all doubt and comparison:

Continental Motor	Warner Clutch	Rayfield Carburetor
Timken Worm Drive	Warner Transmission	Gemmer Steering Gear
Timken Front Axle	Detroit Springs	Smith Pressed Steel Frame
Timken Rear Axle	Long Radiator	Pierce Governor
Timken Bearings	Eisemann Magneto	Stewart Vacuum System

Quick Deliveries!

—the kind you can depend on. Our production keeps pace with all contract requirements. **ACME** Dealers never wait for trucks—never delay or lose sales on this account. This feature alone is **big**—means **sure profits** to the dealer—**insures his sales!!** You want this kind of factory co-operation.

Write for Agency Offer!

—or if you are located nearby, send the Coupon. Learn how you can double and treble your business with ACME Worm-Drive Trucks.

Get our unusual **profit-proposition.** If your territory happens to be open, here is a great chance to secure the agency. Learn of our co-operative plan of building your business. Act now! Address—

Cadillac Auto Truck Company

110 Mitchell Street
CADILLAC, MICHIGAN

CADILLAC AUTO TRUCK COMPANY
110 Mitchell St.
Cadillac, Mich.

Please supply complete information about the ACME 2 Ton and 1 Ton Trucks and Blank Agency Contract, with full details of your attractive offer for progressive representation in this territory.

Firm Name.....
Individual Name.....
Address .....
Town ..... State.....
Present Agent for.....

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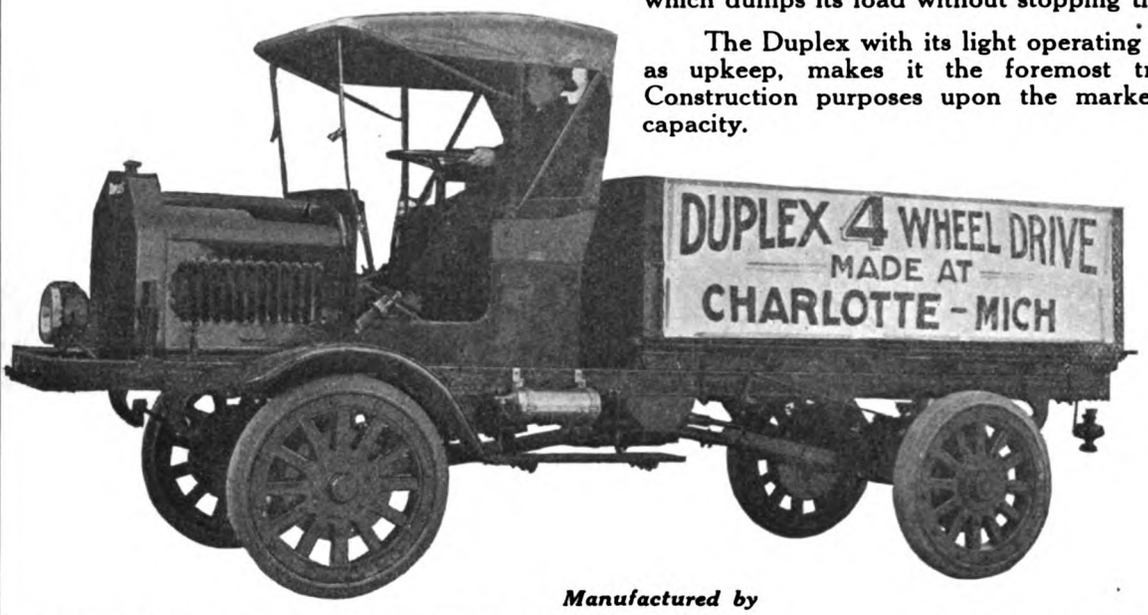
DUPLEX 4 WHEEL DRIVE

THE TRUCK OF EARNING EFFICIENCY

This cut represents the Duplex 4-Wheel Drive Road Truck, and is one of many others hauling one hundred and fourteen yards of gravel every twenty-four hours, a distance of 7.7 miles and at $1.00 per yard, earns $114.00 per day.

This truck with trailer has Duplex Side Dump Body which dumps its load without stopping the truck.

The Duplex with its light operating expense as well as upkeep, makes it the foremost truck for Road Construction purposes upon the market regardless of capacity.



Made in two-and three-ton capacity

Manufactured by

DUPLEX POWER CAR CO., Charlotte, Mich.

One Thousand Miles on High Gear

OVERLOADED 20 PER CENT.

Every hill on this route through Ohio and Michigan was taken on high without straining. Read the story in our booklet "The Wizard of Trucking." Only a Six and only a "Globe" could do it on 12½ miles per gallon of gas.



Six Cylinder Motor

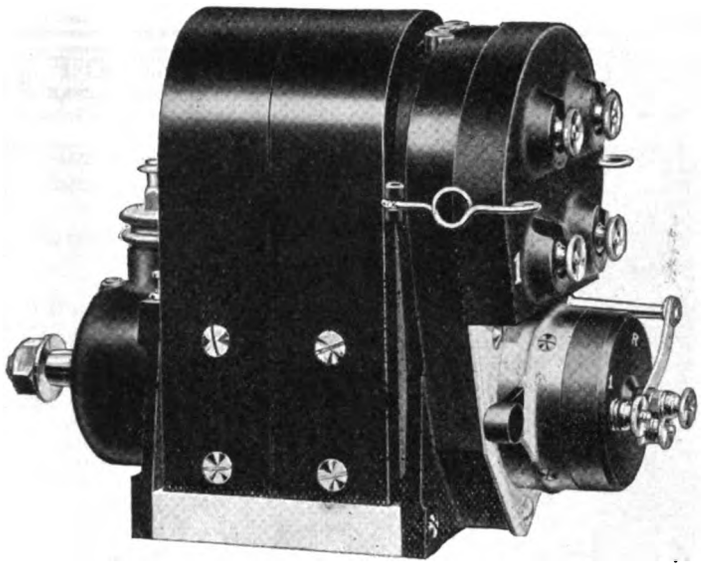
trucks handle like a pleasure car. Start easier. On high 1½ miles to 25 miles per hour. 11 to 15 miles per gallon of gas. Quieter operation. Minimum motor vibration. Go anywhere, any roads, any time. Agencies being established rapidly. Write today.

MFG. BY

THE GLOBE MOTOR TRUCK CO.

NORTHVILLE, MICH.

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NEW DEPARTURE BALL BEARINGS

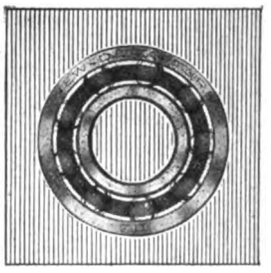
American Made for American Trade

contribute a large measure of efficiency to many present day power plant auxiliaries.

As the new models appear, more and more of this apparatus will be found equipped throughout with New Departures.

How these power saving Ball Bearings are made and what they accomplish in actual service, is entertainingly told in our book entitled "Ball Bearings in Commercial Applications."

Send for a copy.



MAGNETO TYPE

The New Departure Mfg. Co.

Bristol, Conn., U. S. A.

Conrad Patent Licensee

Western Branch: 818-20 Ford Bldg., Detroit, Mich.

Distributors in Trade Centers Throughout the United States
Sole British Agents: Brown Bros., Ltd., London and Manchester
Continental Europe: Jacob Holst, Copenhagen, Denmark

Lippard-Stewart
-the Best Motor Truck in America

Sell Service— Not Trucks

Performance is the thing your customer demands, and you must have "performance" to sell him.

He is not interested in a motor truck for itself alone: he is interested in the service that truck can give.

He is not concerned over the price of the truck, but he is vitally concerned with the cost of delivery per package—or per mile.

The motor truck is only a means to an end, and that end is economical hauling.

There are many efficient trucks on the market today, but none promises better performance than the Lippard-Stewart;

—none can show lower cost per package delivered than the Lippard-Stewart;

—none can show a cleaner record in competitive tests than the Lippard-Stewart;

—none can compare with the Lippard-Stewart in low maintenance cost.

The Lippard-Stewart does not require service of the dealer; it **renders** service to its owner.

When you sell performance—not simply trucks—you must have the goods back of you. The Lippard-Stewart—the Best Motor Truck in America—backs up the dealer on every point—makes good on every promise.

Write for catalog and other literature.

Lippard-Stewart Motor Car Co.
233 West Utica St., Buffalo, N. Y.

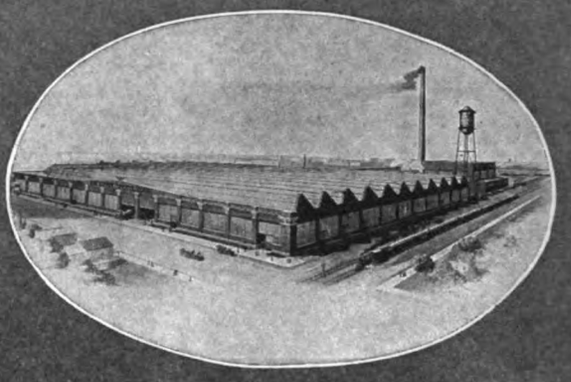
½ TON, ¾ TON, 1 TON,
1½ TON AND 2 TON TRUCKS



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U. S.

BALL BEARINGS



Where the Quality is Built Into U. S. Ball Bearings

It is in the grinding operation that real quality is built into any ball bearing.

No matter how fine the design—no matter how high quality the materials used—unless the grinding operation be microscopically accurate, the finished bearing is but a makeshift,

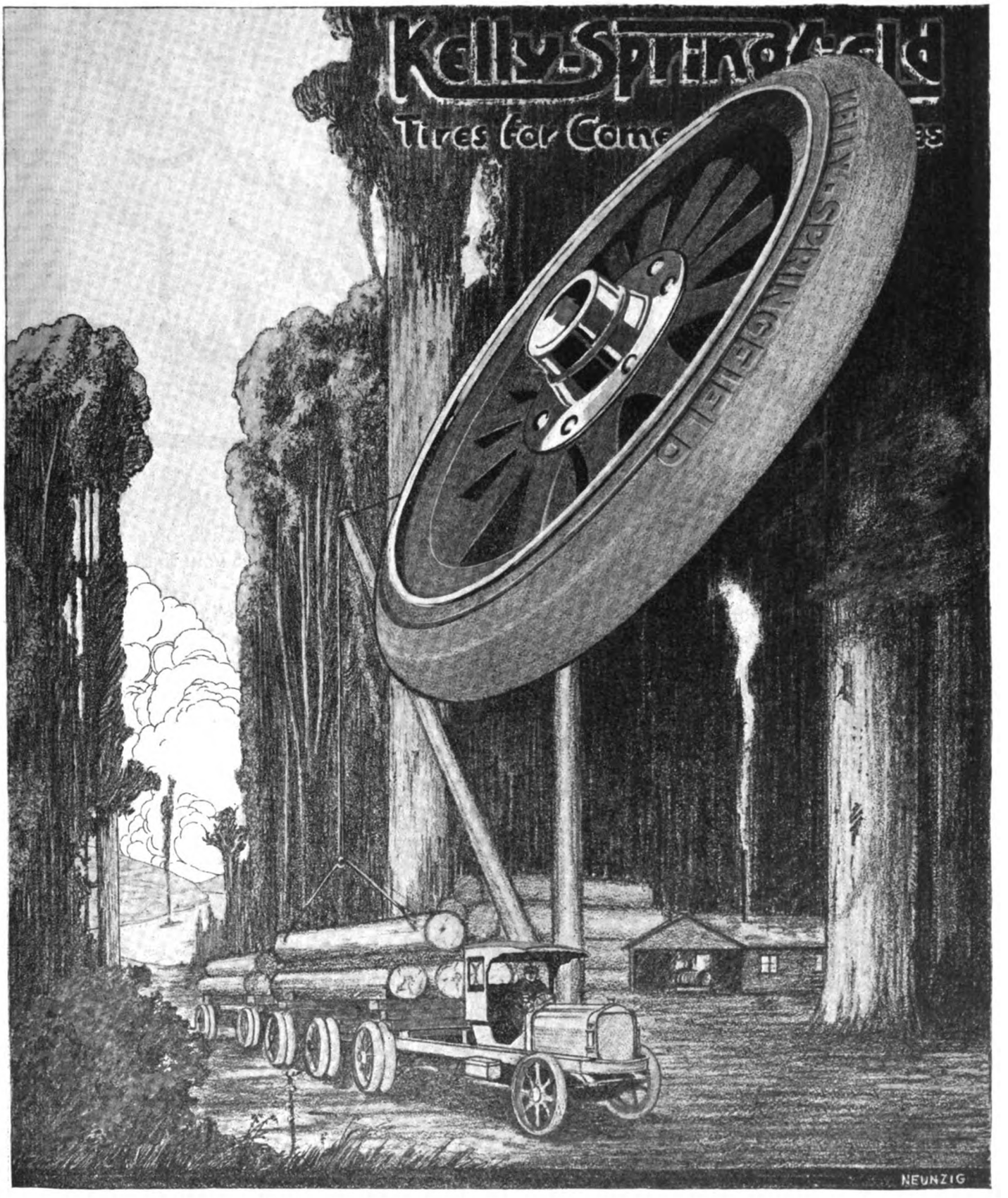
So far as we are able to ascertain, there isn't a grinding department extant that is the superior of that in the U. S. Ball Bearing factory—illustrated herewith—and there are few equals.

The inherent superiority of U. S. Ball Bearing grinding machines lies in the fact that they are specially designed to do ball bearing grinding. Extra heavy and massive, they practically eliminate vibration and in this way provide the smoothest possible finish combined with microscopic accuracy—accuracy held within limits of one-ten-thousandth of an inch

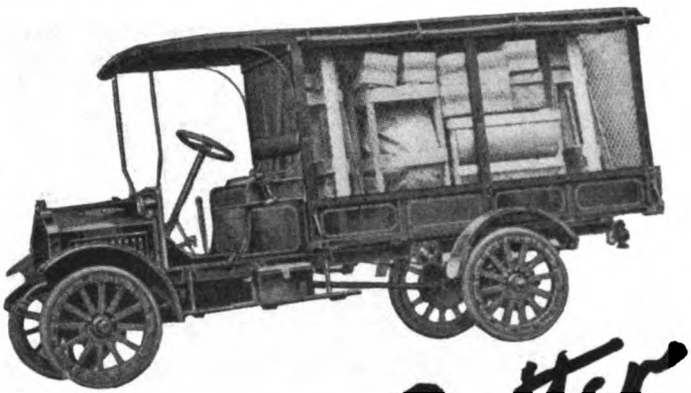
U. S. Ball Bearing Manufacturing Co.
(Conrad Patent Licensee)
Palmer St. and Kolmar Avenue, Chicago

Insert at top shows new U. S. Ball Bearing factory
General view shows part of internal grinding department

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A Better Truck is not for Sale!

WHEN the enthusiastic representative of a motor truck manufacturer tells you that his line is better than the Bessemer, well, he's mistaken!

A better truck is not for sale. Money can't buy higher quality than is built into

THE BESSEMER LINE

With component parts made by the acknowledged leaders of the truck industry, our experienced designers have conceived and caused to be built a rugged, dependable truck, simple in construction, powerful, economical in first cost and operating expense and efficient in service even when driven by unskilled or careless drivers.

For Contractors and Merchants

these trucks offer the means of lowest cost transportation. They are light without having strength sacrificed, strong without being clumsy, simple without economizing on essentials.
At their respective prices our various models offer the fullest values for like capacities. We are more than ready to enter at any time, in any place, for any service, a series of competitive tests and to accept the verdict of the unbiased prospective purchaser.

One-Ton	Two-Ton	Three-and-One-Half-Ton
Internal Gear Shaft Drive	Worm Drive	Worm Drive
$995	$2200	$3100

DEALERS—Write us NOW for our liberal selling plans. We give interested factory co-operation and enterprising aid to our dealers.

All inquiries regarding territory in New England, Eastern New York, Eastern Pennsylvania, New Jersey, Delaware, Maryland, Virginia and District of Columbia should be addressed to our Eastern distributors:

Bessemer Motor Truck Corporation

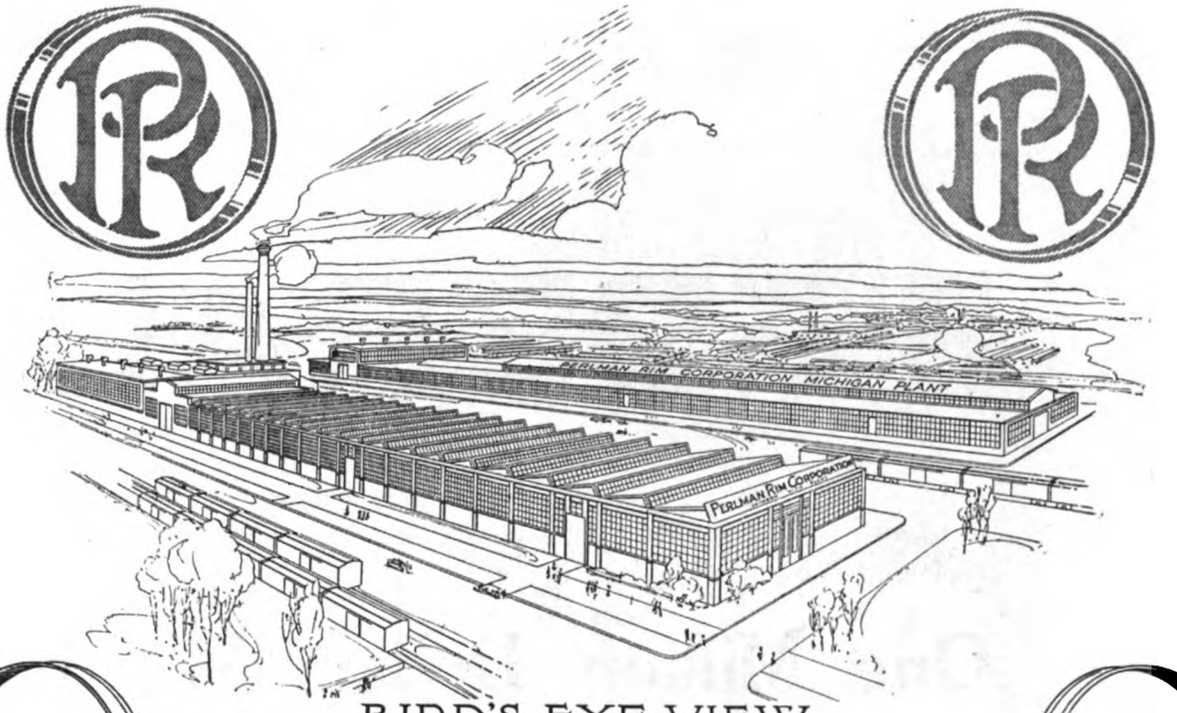
Lexington Avenue and E. 42nd Street NEW YORK CITY

All other inquiries to

BESSEMER MOTOR TRUCK COMPANY : GROVE CITY, PA.

BESSEMER

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BIRD'S EYE VIEW
of the
PERLMAN RIM CORPORATION
JACKSON, MICHIGAN, PLANT

The largest and only exclusive demountable rim plant in the world, covering five acres.
The mechanical equipment is new and up to date, ensuring volume and quality production.
Producing five thousand sets of demountable rims every working day.
Enough to equip over one million, five hundred thousand (1,500,000) motor cars annually.
Prompt shipments of demountable rims in any desired size and quantity.

Perlman Patent Protection Policy Protects Purchasers.

Perlman, the Original Demountable Rims are—

FIRST in Quality, Quantity, Service, Saving, Economy, Efficiency, Use and Value—

We solicit your demountable rim business, inviting correspondence.

PERLMAN RIM CORPORATION

(Controlling Perlman Demountable Rim Patents)

MANUFACTURERS OF

Demountable Rims

Plain Clincher and all styles of Q. D. Demountable, Straight Side or Clincher

ALL CORRESPONDENCE SHOULD BE SENT TO THE

Executive Offices and Sales Department

No. 1790 BROADWAY
United States Rubber Co. Building
Broadway and 58th Street
New York, N. Y.

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Another

FEDERAL

One hundred and fifty Federal dealers at the fifth annual Federal Convention early in September established a new record in motor truck circles when, in less than fifteen minutes, they gave definite orders for

One Million Dollars Worth

of one new 1917 model Federal, exhibited for the first time at this convention. No greater tribute was ever given any motor truck company than this.

These Federal dealers knew the new model would be all or more than was promised them—and they did not hesitate to invest in its future.

They knew the past records of Federals—their records of performance, their great percentage of repeat orders.

And just as 1916 has been the greatest year in the history of the Federal Company, so is 1917 going to be even greater.

The great increase in Federal production, and the 1917 additions to the Federal line make it the best dealer's proposition in the Motor Truck World today.

The Federal Motor Truck Co.

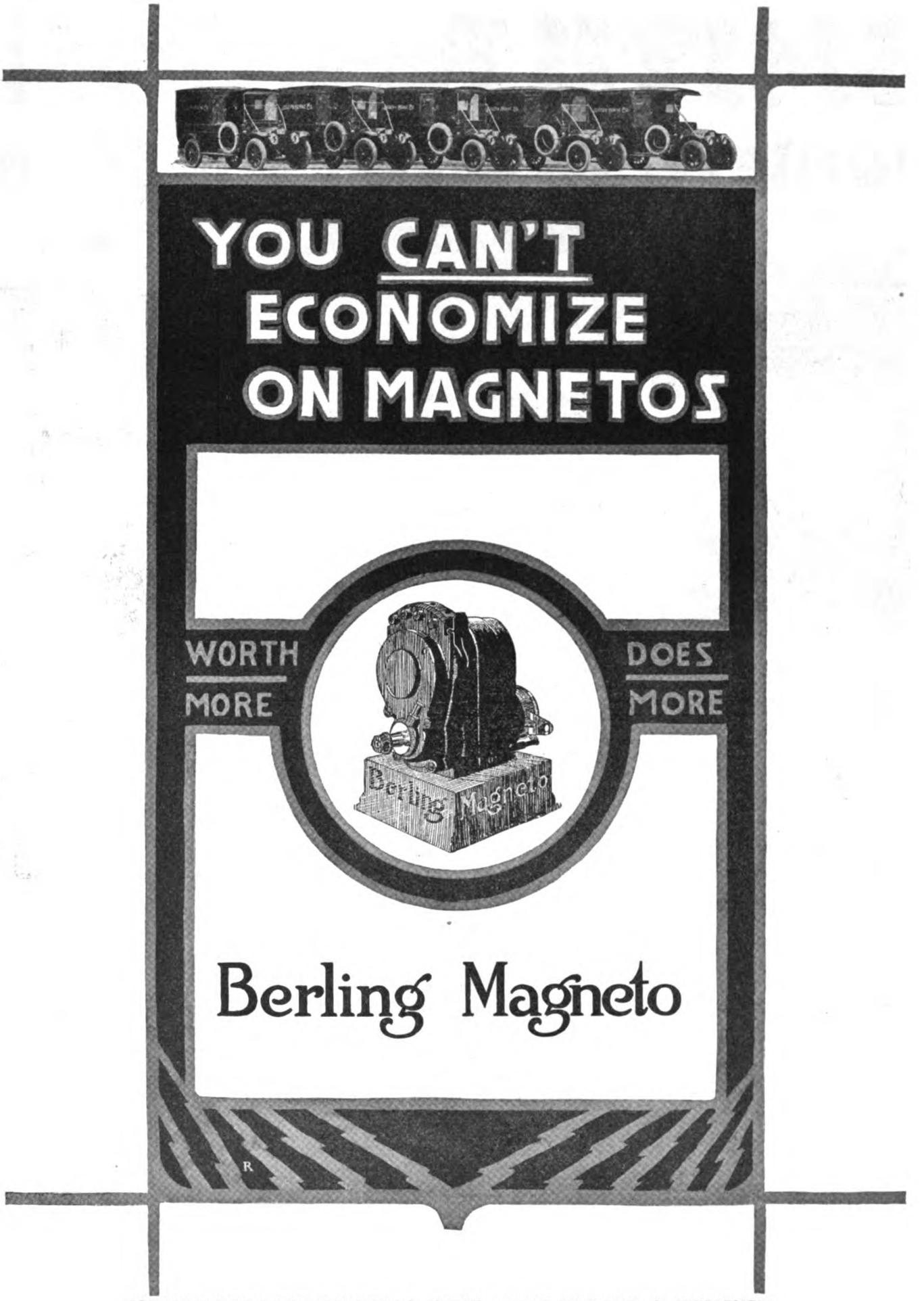
DETROIT, MICHIGAN

Their ninth

FEDERAL



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SMITH Form-a-Truck

Dealers are the Big Men in their Territory













SMITH Form-a-Truck is paving the way to better business, bigger profits—more satisfactory delivery in every line of business in every part of the country. Thousands are in daily service in work ranging from that done by the biggest corporations—Armour & Company, Standard Oil, etc., down to single delivery equipment used by small contractors, one-team delivery concerns, and in equipment used by thousands of farmers.

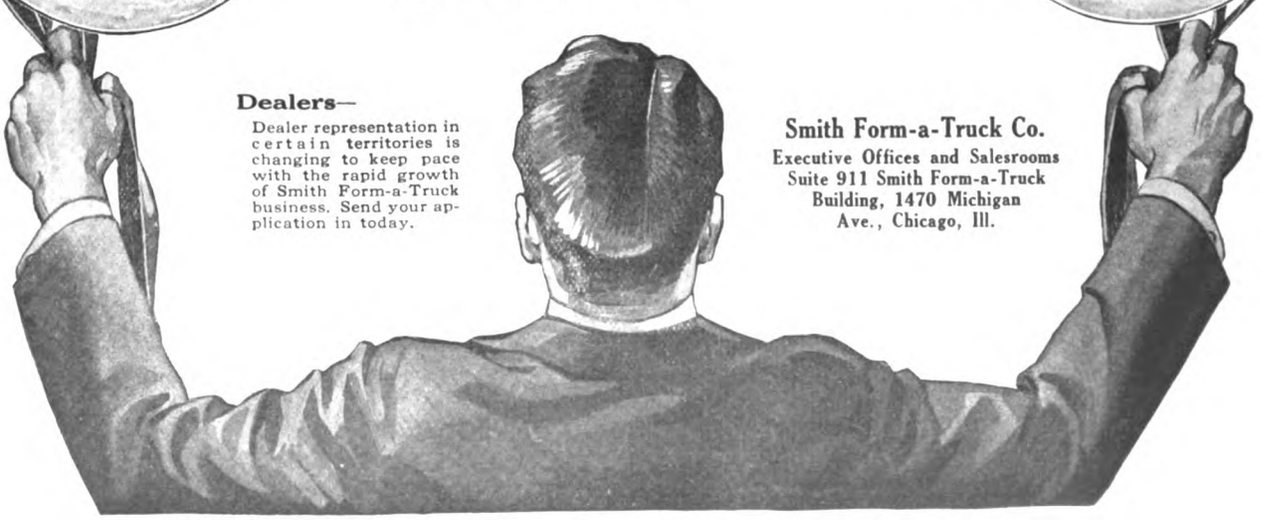
Smith Form-a-Truck dealers, because they are offering the real solution to problems of transportation, the real secret of economy in hauling goods, are the big men in their territory.

Smith Form-a-Truck dealers are building big business from the start. They are in a position to go to any line of industry, however large or however small, with a real story of efficiency—of money earning ability—proved service. The man who sells Smith Form-a-Truck holds the reins of transportation in his territory.

Smith Form-a-Truck has overcome the question of doubtful operating cost—set it on a basis which definitely ranks Smith Form-a-Truck hauling as the lowest hauling cost in the world.

There is no hauling work that cannot be satisfactorily accomplished—at lower operating cost—at greater efficiency by Smith Form-a-Truck than by any other form of delivery.

And Smith Form-a-Truck is the dominating attachment in the motor truck world—dominating in sales (44,000 contracted for)—dominating by service (proved records of economy that cannot be duplicated)—dominating in real value (a real truck construction, correct from every engineering viewpoint).



Dealers—

Dealer representation in certain territories is changing to keep pace with the rapid growth of Smith Form-a-Truck business. Send your application in today.

Smith Form-a-Truck Co.
Executive Offices and Salesrooms
Suite 911 Smith Form-a-Truck
Building, 1470 Michigan
Ave., Chicago, Ill.

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COVERT

Making One Product—And Making It Best

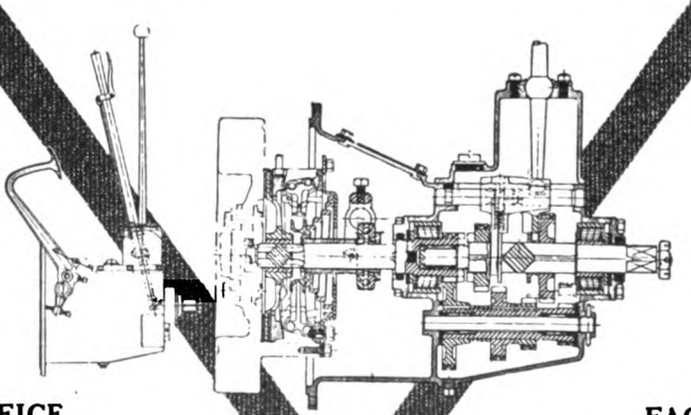
Recognition of the merit of Covert Transmissions has come from years of the hardest kind of service in both pleasure cars and motor trucks.

It is a recognition based neither on mere theory of design nor on advertising claims—but upon absolute dependability of performance.

Covert Transmissions are made in a full line of types and sizes; for both commercial and pleasure car use.

Our Engineering Department will welcome an inquiry from you on your transmission problems.

THE COVERT GEAR CO., Inc.



SALES OFFICE
DETROIT, MICH.

FACTORY
LOCKPORT, N. Y.

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A 1 TON TRUCK with the Ford Cost of Upkeep—

$325

F.O.B. Detroit

Everyone knows the exceedingly low operating cost of the Ford and everyone is going to know how the TONFORD truck unit attached to *any* Ford chassis, old or new, greatly reduces delivery costs—how it carries the same load more places, more quickly than any other one-ton truck and at much less operating cost.

The TONFORD truck unit is built of the best materials. Its specifications compare most favorably with the best one-ton trucks—and you do not have to pay the original price of an ordinary one-ton truck, nor its higher maintenance cost.

The TONFORD truck unit has a wheelbase of 127 inches—longer than most trucks of similar capacity. It has a loading space of 9 to 11 feet back of the drivers' seat and up to six feet wide, depending on the style of body. The heat treated rear axle, 2⅛ x 2⅛, is guaranteed for one and one-half tons. Its roller bearings will bear 7500 pounds weight. Its wheels are heavy artillery type.

Every detail of the construction of the TONFORD truck unit is made to stand the hardest kind of work, and the heavier construction throughout gives it a liberal factor of safety for the overload.

This unit is easily attached to any Ford, old or new, and should the car be desired again for pleasure, it may be as easily detached. Only four holes to drill.

If a one-ton truck will do—a TONFORD will do it better. Get a TONFORD. Immediate shipments—no long waits—big production. Write at once.

Detroit Truck Co., Mfrs.
Detroit, Mich.
U. S. A.

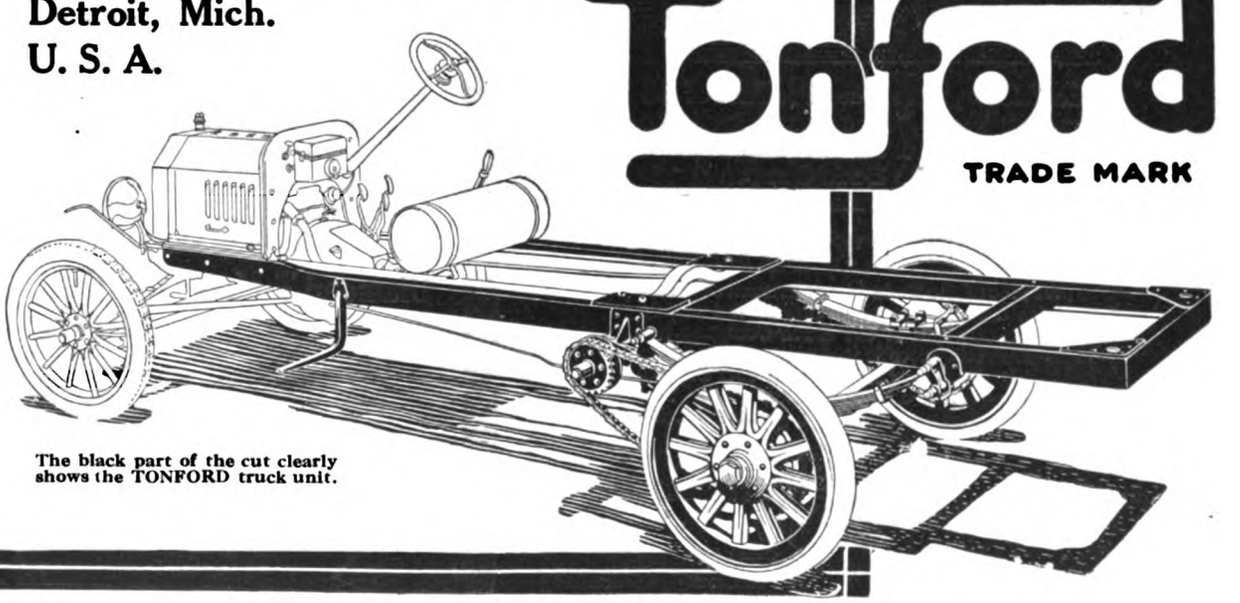
DEALERS

Here is the big, live opportunity of the year. Deliveries NOW. Sales opportunities everywhere. Some one will sell the TONFORD truck unit in your locality, why not you? Write now.

MADE IN DETROIT USA

Tonford

TRADE MARK



The black part of the cut clearly shows the TONFORD truck unit.

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Cullman Sprockets

For Diamond, Baldwin and Whitney Chains

Differentials

Sprockets in stock and to order

Send for Catalog

Cullman Wheel Co.

1350 Allgeld Street

CHICAGO

Standard

MADE IN DETROIT USA

Motor Trucks

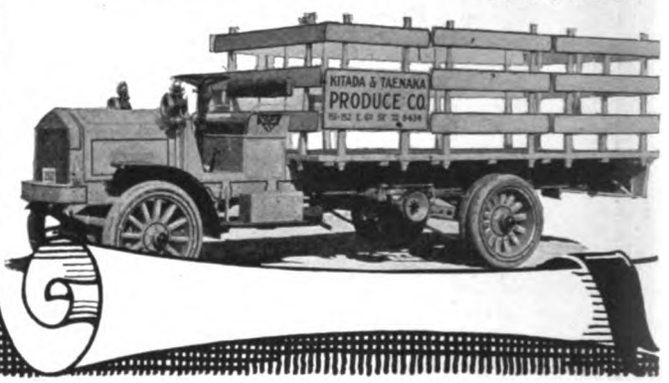
Startled the Motor Truck Industry By a Unique Sales Plan

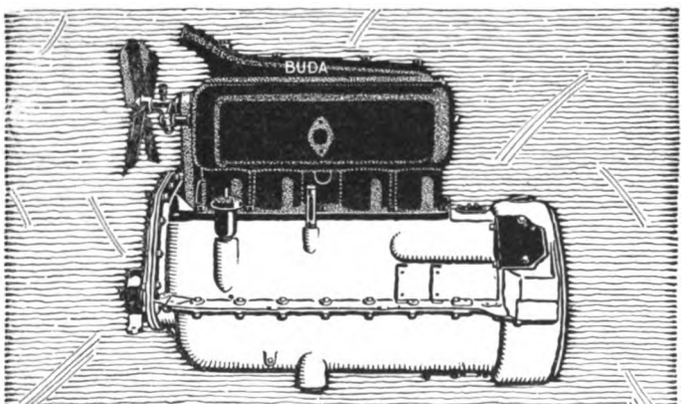
First of all, the Standard is an unusual truck. It is a powerful combination of many of the world's best-known units—the Continental Motor; Timken Axles; Timken Bearings; Brown-Lipe Gears, and other well-known standard parts

The Standard Motor Truck is sold in an unusual way. Any responsible person can be the agent for the Standard, with absolutely *no investment—no deposit* and *no contract.*

Write for details of this plan. *No obligation.*

STANDARD MOTOR TRUCK CO., 315-327 Bellevue Ave. Detroit, Mich.





Buda Motor, "the Fine Product of 35 Earnest Years," is acknowledged the standard in its field. Its unequalled record is the result of the Buda Company's 35-year policy, "Performance, not Price."

BUDA TRUCK MOTOR

The presence of the Buda Motor in truck or pleasure car is a guarantee of quality in the vehicle through the strength of the Buda Company behind it. But, still more is it a guarantee because it is a piece of *fine machinery*, which *does its work* superbly—day after day, year after year. You will find it in many of America's greatest trucks.

THE BUDA COMPANY — HARVEY CHICAGO SUBURB ILL.

THE BUDA COMPANY BUDA MOTOR "the part to buy the car by" ESTABLISHED 1881

DIAMOND T

TRUCKS

Diamond T Service is as thoroughly built into our ¾-ton trucks, the smallest of the line, as it is in our 3½ ton model.

Its low cost is made possible only by its wide popularity which has enabled us to produce this model in enormous quantities. There has been no cheapening of quality or inferior workmanship permitted in its design or construction.

For a thousand uses it is the most satisfactory and economical delivery vehicle ever marketed. With a body suited to your requirements, it will improve your delivery service while lessening your operation expense.

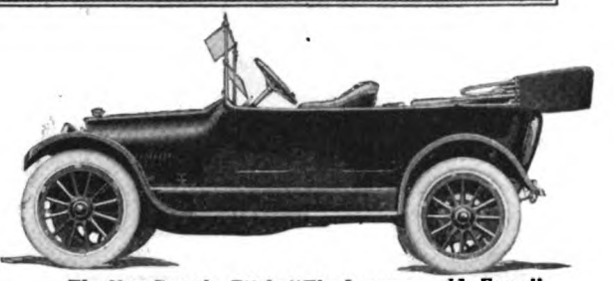
Write to-day for catalog.

Diamond T Motor Car Co., Chicago, Ill.



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Reo



The New Reo the Fifth, "The Incomparable Four," $875 f. o. b. Lansing, Michigan

Here's the Secret of Reo Reliability

DOUBTLESS YOU'VE WONDERED—knowing ing as you do, how absolutely dependable are Reo cars—how free from troubles, and how low in upkeep cost:

YOU'VE WONDERED wherein lay the secret of that reliability that is Reo.

WELL, WE'LL TELL YOU. And then you'll wonder at its ridiculous simplicity.

YOU READ, IN THE ADS, how this engineer or that inventor has revolutionized the science of engineering and produced a wonder-working car.

YOU READ THAT every year—only this year it's another engineer. That revolutionary stunt of last year has been forgotten. It was as impotent as a South American revolution—it didn't!

SO THE SECRET ISN'T to be found in any such feat or invention.

REO PERFORMANCE—reliability, dependability, uniformity of performance of all Reos, of whatever model or price—is the result of the taking of infinite pains in the designing, the making and the inspection of the Reo product.

IT'S THE LITTLE THINGS that count—not the big ones.

ANYONE—A BOY EVEN—can make a motor that will be "different." Or an axle, a transmission or a set of springs that might impress the tyro as new and wonderful.

BUT TO MAKE ANY of these vital units better—that is the task—that should be the aim. It has always been the Reo aim.

INFINITE CARE in the fabrication and then in the inspection, and finally in the testing of the assembled whole—that is the secret of Reo success in making, not the most but the best, automobiles.

IF THERE ARE 2000 PARTS in a motor car; and if there's an average of four machining operations on a part—that's 8000 chances for something to go wrong!

AND ONE DEFECTIVE PART—one, however small or seemingly insignificant—that does not fit absolutely, and you'd have a car that would be less than a Reo in performance—more than a Reo in cost of upkeep.

"THOSE PESKY LITTLE TROUBLES that are always happening with other cars, are unknown to the Reo owner," says one Reo dealer, "and that's why the demand for Reos is so great."

WHEN YOU STOP TO THINK about it, the troubles you've had with other cars were not big troubles. Your motor didn't drop out of your car or your transmission strip or your frame break in two.

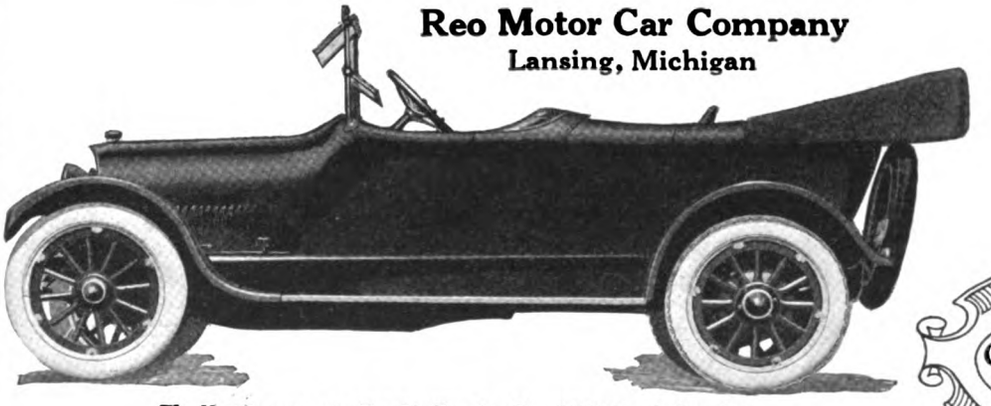
IT WAS THE LITTLE THINGS that pestered your motoring life—parts shaking loose or getting out of adjustment. Dust in bearings—oil leaks—everywhere. Squeaks and creaks and rattles. Always the dread when starting out that you might not return.

WELL THEREIN LIES the big difference between Reos and other cars—the big difference is in attention to the little things.

IT IS NOT UNCOMMON—in fact—it is the rule—for a new Reo owner to drive his car thousands of miles—a year, two years—without even seeing the inside of a garage or lifting the bonnet to make an adjustment or repair.

HONOR AND FAITH and a Good Intent—these and the attention to little things they dictate—result in Reo Reliability as it is known the world over, "The Gold Standard of Values" in automobiles and motor trucks.

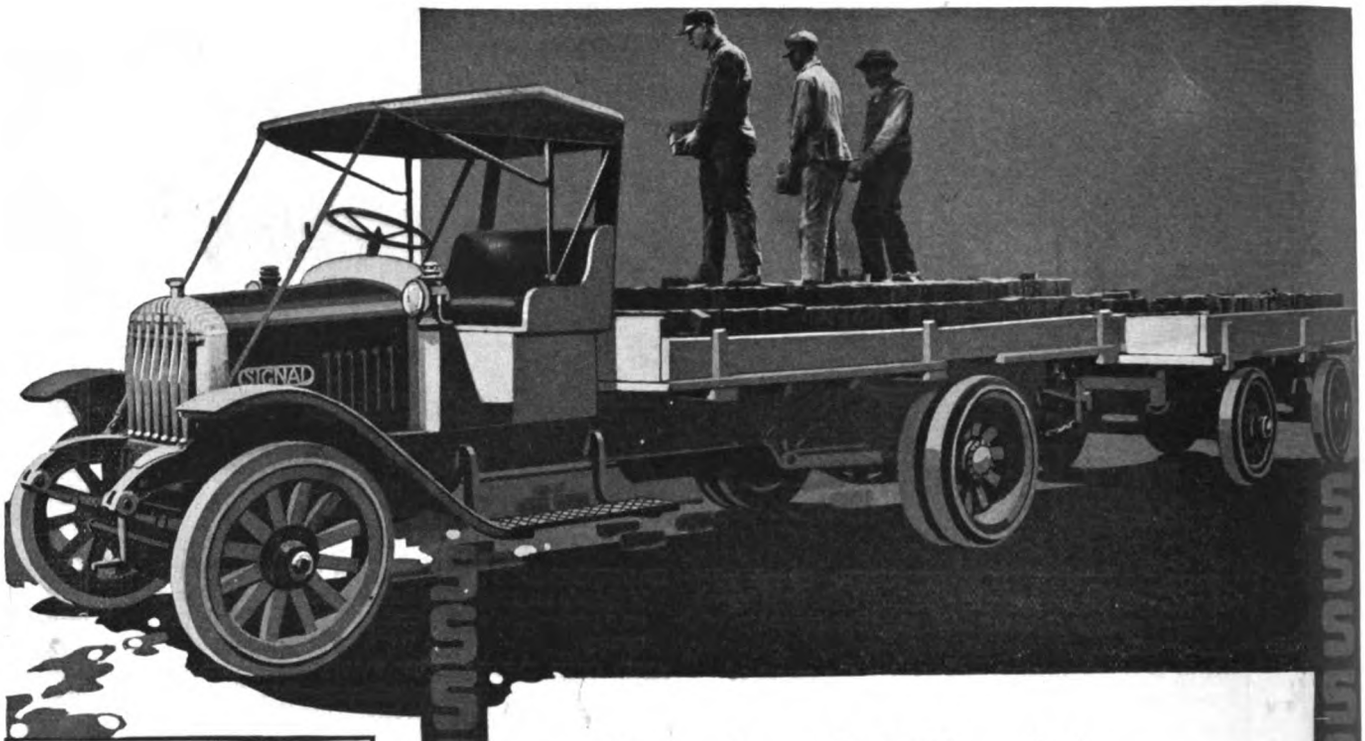
Reo Motor Car Company
Lansing, Michigan



The New 7-passenger Reo Six Touring Car, $1150 f. o. b. Lansing

"THE GOLD STANDARD OF VALUES"

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"On the Job"—Always

Here's another illustration showing a Signal Motor Truck doing one of the things it is designed to do—another proof of that virility that keeps the Signal always on the job.

The fundamental virtue of Signal Motor trucks is that ability to be "on the job" and stay on the job.

That is precisely what you buy a truck for. All other truck virtues fade into insignificance compared to the ability to be always *on the job*.

This quality bespeaks all other desirable qualities, for no motor truck *can* persistently stay *on the job* unless it has all the inherent virtues of right design, substantial construction, efficient mechanism and a wide factor of safety for overloads.

Ask a Signal owner about his truck, and when he says it is "on the job" he gives it the highest praise.

It's the delays, the holdups, the failures to "deliver the goods" that make a truck costly.

It's the ability to carry the load and obediently and willingly *keep on* carrying the load, without a murmur that determines truck value, and makes Signal trucks the criterion of truck value.

Of course if the Signal trucks did not possess the cleanest chassis, the strongest construction, the healthiest and most reliable mechanism they simply could not stay on the job.

But they do stay "on the job"—and if that sort of a truck appeals to you as an owner or dealer, we will be pleased to submit full information about Signal Motor Trucks. Write.

SIGNAL
1-1½-2-3½&5 TON

Important Constructional Features

Continental Motors

Timken-David Brown, Worm-Drive Rear Axles

Ross Steering Gear

Brown-Lipe Transmission

Eisemann Magneto

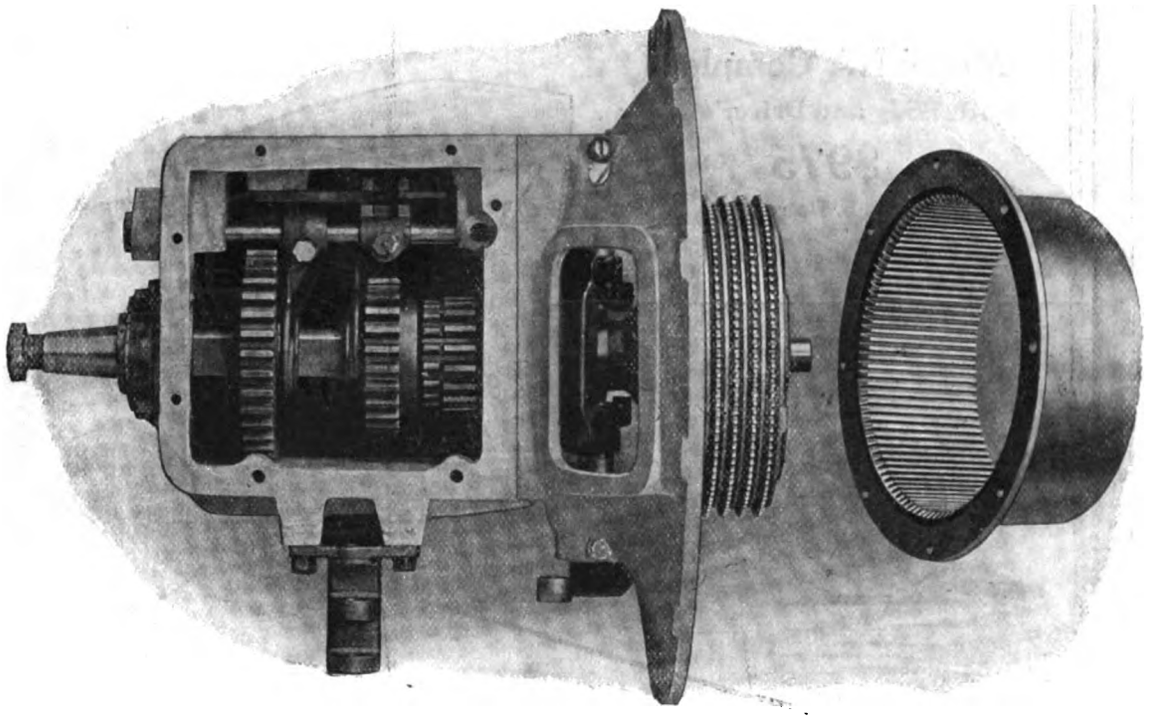
Detroit Self-Lubricating Springs

Stromberg Carburetor

Signal Motor Truck Co.

DETROIT, MICHIGAN

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All Brown-Lipe Transmissions Are Quality Transmissions

There are no cheap or slighted Brown-Lipe transmissions. There are variations in type and size—but never in quality.

Throughout the entire range of size and style all Brown-Lipe transmissions carry Nickel steel gears and Chrome Vanadium steel shafts. All bearings are mounted in malleable cages instead of being simply held in the case.

The rigid and frequent inspections of practically every operation are maintained in the smallest set just as they are in the largest.

So that wherever or whenever encountered—a Brown-Lipe transmission means the highest quality transmission that we know how to build—after more than a quarter of a century's experience in gear building.

BROWN-LIPE



Transmissions

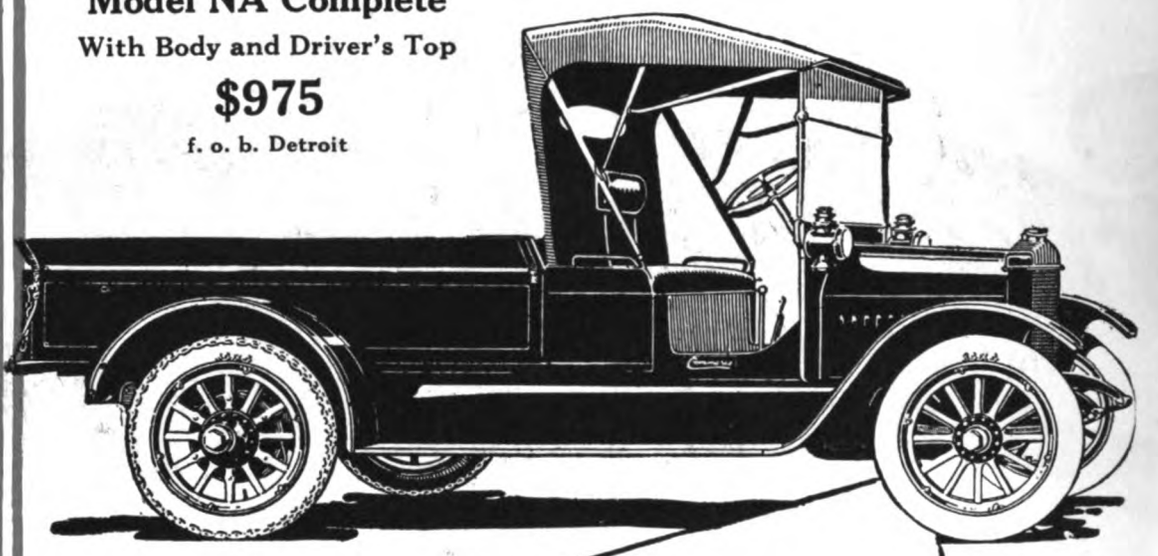
BROWN-LIPE GEAR CO.
SYRACUSE N. Y.

BROWN-LIPE-CHAPIN CO.
Differentials

NEW YORK—Thos. J. Wetzel, 29 West 42d St.
DETROIT—L. D. Bolton, 2215 Dime Savings Bank Bldg.
CHICAGO—K. Franklin Peterson, 122 So. Michigan Ave.
SAN FRANCISCO—A. H. Coates, 444 Market St.
Foreign Agent, Benjamin Whittaker, 2, Norfolk Street, Strand, London, W.C.

Digitized by Google

Model NA Complete
With Body and Driver's Top
$975
f. o. b. Detroit



The Work of Two Teams
For Two Years—
6500 Miles of Tire Wear—
14 Miles Per Gallon of
Gas Month After Month—
Repairs Almost Nothing
G. Sturm

Extracts from letter of George Sturm, Mfr. of Fine Candies, Philadelphia, Pennsylvania.

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Commerce

1500 POUNDS CAPACITY

TRUCKS

$975 Complete Choice of 3 Bodies

Just note how Mr. George Sturm, of Philadelphia, writes regarding his Commerce

And then, as further evidence of his sincerity, and complete satisfaction, Mr. Sturm goes on to say that we are free to publish his letter, and to refer any prospective COMMERCE customers to him direct as to further details of his actual experience with the COMMERCE truck.

It doesn't seem necessary to lay emphasis upon the value of a truck agency which has thousands of just such satisfied customers as Mr. Sturm plugging for it and which is making good day in and day out with thousands of users throughout the country.

It is a real opportunity for real live dealers—an opportunity that isn't often found.

If you are at all skeptical as to the exact value of the COMMERCE agency, we will gladly put you in touch with several of our dealers in your vicinity, and from them you can find out to your entire satisfaction just what a valuable proposition it is.

If you will investigate the COMMERCE situation you will find that not only is the demand for COMMERCE trucks constant, but that the thousands of users of COMMERCE trucks are not only satisfied, but enthusiastic over the performance of the truck. In other words, the COMMERCE truck sold, stays sold, and requires little or no service effort after it has been delivered to the consumer.

Another feature which adds to the attractiveness of the COMMERCE agency is the fact that the Commerce Motor Car Company has provided a plan for financing deferred payment sales, without the payment on the part of the dealer of any commission or brokerage fees, and which also enables the dealer to carry a large stock of trucks if he so desires.

COMMERCE discounts are big, and, combined with our co-operative plans, enable us to offer an exceptional proposition to about 250 more dealers throughout the country. We want these dealers because we are more than doubling our output for the coming year.

COMMERCE trucks are rated at 1500 pounds' capacity, and sell for $975.00, with a choice of three bodies:—Model NC—with body design for grocery, department stores, etc.; Model NH—with standing top and waterproof curtains; Model NA—with open express type body.

All COMMERCE trucks are equipped with Continental motors, Eisemann magnetos, Cast tank radiator, three-quarter floating rear axle with nickel shafts and bearings.

Obviously, with a proposition so attractive as the one we have to offer, we are closing territory only with dealers who can handle the goods satisfactorily in every way. If you are such a dealer get in touch with us immediately. It will be money in your pocket.

COMMERCE MOTOR CAR COMPANY

DETROIT, MICHIGAN

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SPRINGS

designed to insure

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with

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Genuine made only by

The Mather Spring Company

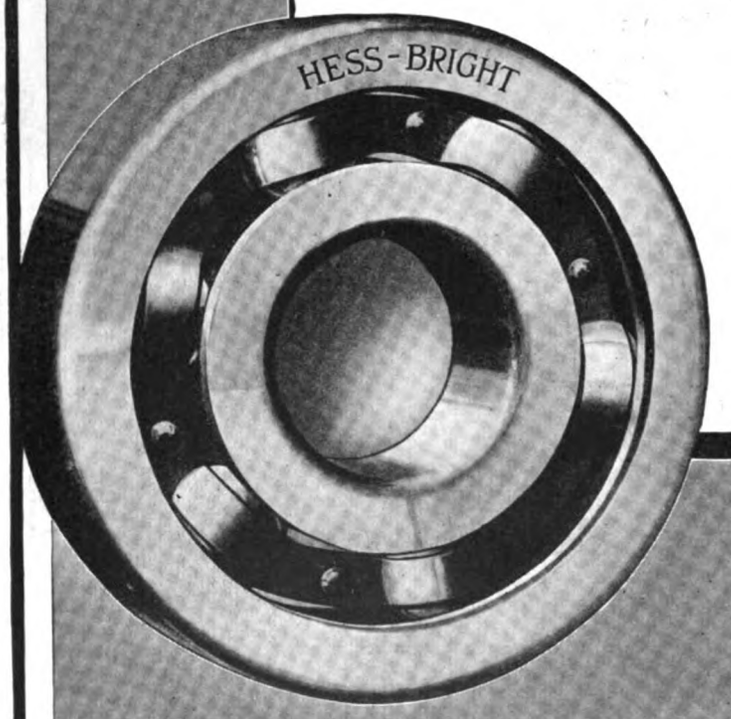
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THE HESS-BRIGHT MANUFACTURING COMPANY
PHILADELPHIA, PA.

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BECAUSE they are well and favorably known in the Truck Industry and are a help to Truck Sales.

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750 HEATH STREET **LAFAYETTE, IND., U. S. A.**

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The COMMERCIAL VEHICLE
Read by Business Men

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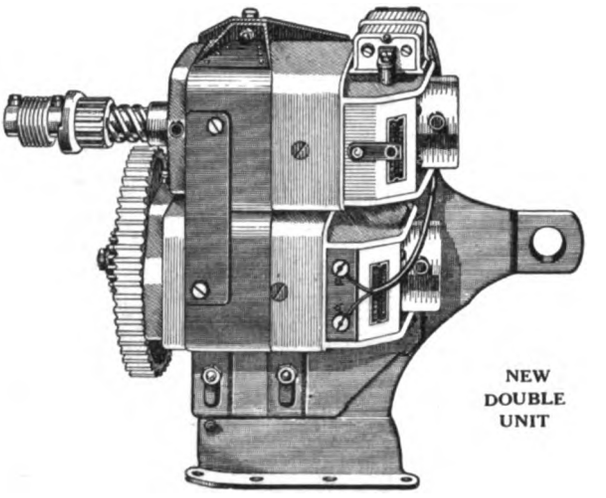
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The COMMERCIAL VEHICLE
Read by Business Men
Vol. XV November 1, 1916 No. 7

Great Production Prevents Radical Changes for 1917

Continuing War Demands and Increasing Domestic Call Raise Production; But Material Shortage Boosts Prices Higher

PRODUCTION has been the passion of the commercial vehicle industry during 1916. Last year was the dawn of the production era in the motor truck world and with it came great improvements in motor truck design and construction. The present year in the truck business has been practically a continuation of 1915. Most of the makers have contented themselves with continuation of 1916 designs for 1917 except where exigencies in the material markets made certain detail mutations imperative.

Production of commercial vehicles in 1916 has been greater than in any previous year, so far, and by the end of the year a considerable increase will be shown over the production in 1915, nothing like such an increase in percentage, however, as that of last year over the year previous.

Few New Models

There have been few additional models offered by established makers and a decline in the number of new concerns entering the field, since the strength of the demand both domestic and foreign, but particularly domestic, coupled with the unprecedented scarcity of materials and labor left each manufacturer enough to do merely to build sufficient of the models already in production, without venturing upon new ones.

While this article is concerned principally with the domestic situation, and it is impossible to discuss it without reference to the widespread effects of the great war, the increase in production has not been entirely due to war orders. Most of the increase is due to the prosperous condition of many of our own industries, not including the munitions business, indirectly affected by the war.

Since Mars has motorized his chariot the motor truck industry has really come into its own. War orders for trucks have made possible the tremendously increased production during the past two years. This, in turn, has made possible the extraordinarily rapid engineering development of the commercial vehicle which has been effected since 1915, so that the truck of 1917 is almost an entirely different vehicle from its predecessor of a few years ago.

Up until the close of 1915 the effect of the war was almost entirely for good, but the tremendous demands of munitions plants for steels and other materials used in truck production, coupled with the sweepingly accelerated production of passenger cars has introduced an adverse element in the war's effects. The war has accelerated development of truck construction and last year witnessed vast improvements in the quality of vehicles offered at reduced cost.

During 1916, however, the situation in both the material and labor markets has resulted in sharp increases in the production costs of motor trucks. Prices have not increased in anything like equal proportion with the increased cost of material and labor, in fact, not even in proportion to actual production costs.

Forced Efficiency Improvement

Production costs also have not increased as much as costs of material and labor for the reason that with increased production most of the factories have been able to use both more effectively, and particularly labor, and, with a greater output, in many cases with very little increase in overhead, they have been able to afford a smaller margin of profit on each truck, with increased gross earnings notwithstanding.

The range of models of motor trucks continues about as it has been for years past except that there are more of the intermediate capacities, while the average capacity of models produced remains about 2½ tons, as it has been for several years.

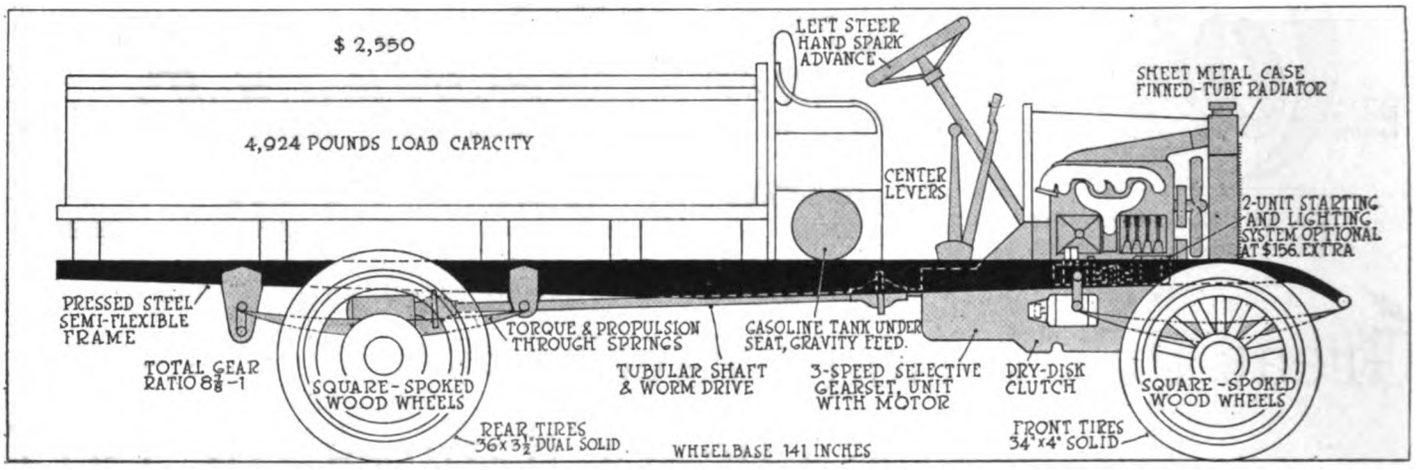
In the range of models from less than ½ ton up to 7½ tons and tractors, there is a definite division into

TRUCKS USING STOCK ELECTRIC AUXILIARIES

Brinton	Little Giant
Briscoe	Maxwell
Burford	Mercury
Couple-Gear	Bulley Tractor
Collier	Old Hickory
Commerce	Old Reliable
Crowther-Duryea	Overland
Denmo	Pullman
Dispatch	Reo
Dorris	Republic
Ellsworth	Royal
Gersix	Rush
Hurlburt	Steele
Jeffery	Stegeman
Knickerbocker	Studebaker
Knox Tractor	Thomas
Lane	Tiffin
Larrabee	Universal
Lippard-Stewart	Wilcox
Zeitler & Lamson	

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The Average 1917 Motor Truck



The composite design of 1917 trucks as shown by the specifications of 386 different chassis published in this issue. The averages and percentages used in determining the above design do not take into account the number of chassis of different models produced, and so do not necessarily represent the average truck which will be put into service in 1917. Details not shown in the sketch are as follows: Motor, under hood, cylinders cast in block, four cylinders, L-head with three bearings. Bore, 4 1/10, stroke, 5 1/3, 26.5 N.A.C.C. horsepower. Lubrication by circulating-splash system. Centrifugal pump water circulation. Single ignition with high-tension magneto and hand spark advance. Centrifugal, motor-driven governor limits speed to 1,250 r.p.m., or 15 miles per hour

two classes, the first being the delivery vehicle class and the second the heavy-duty truck.

The former embraces capacities up to and partially including the 1-tonner and the latter begins with the ¾-tonner and goes up. Production of delivery chassis outnumbers that of trucks two to one, and of the heavier trucks, those which might fall into a medium class, that is, from ¾ to 2 tons, represent a number equal to all of the balance, including tractors.

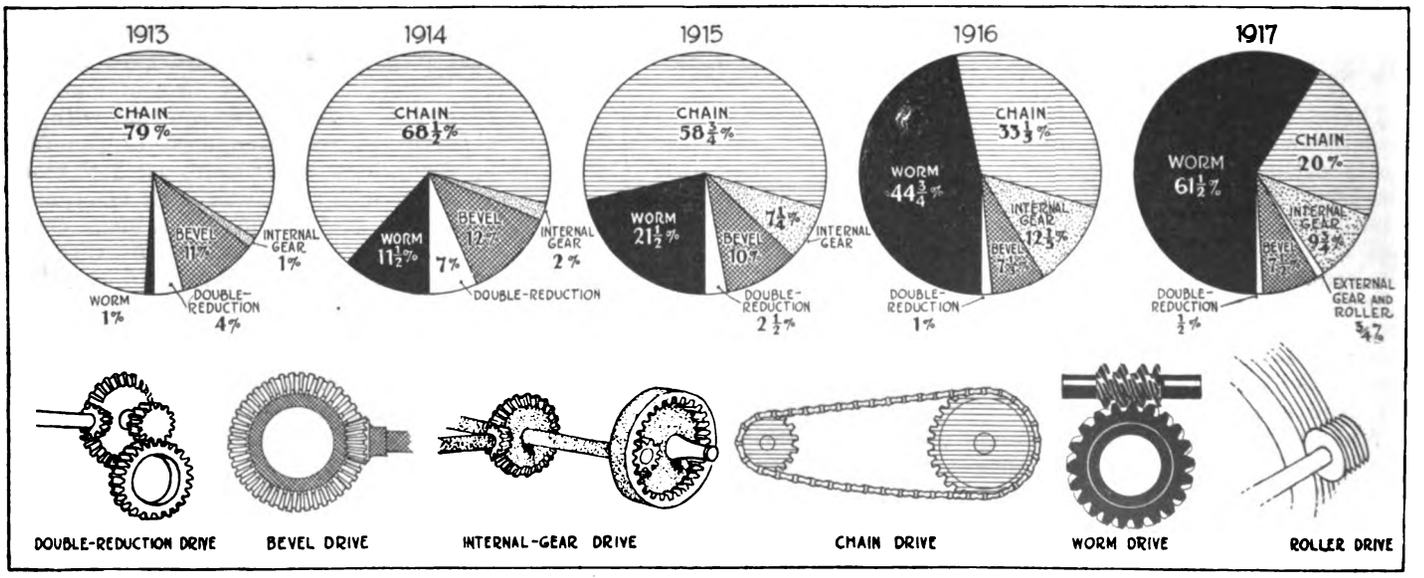
Hence it is plain that the light chassis business is one of quantity production, and it is easy to understand why only 10 per cent of the commercial vehicle producers build fifty per cent of the vehicles. Delivery vehicles are usually mounted on pneumatic tires, each year witnessing a lesser percentage of chassis in this class equipped with solids. This is because only with pneumatic tires is it possible to run a vehicle at high delivery speeds, such as are demanded for efficiency, dispatch and economy, without rapid tire and mechanical depreciation.

Truck Practice Even in Smallest

This permits vehicles of this class to use passenger car design to a great extent with good success, and the majority of vehicles under 1500 pounds capacity are largely made up of passenger car components, many of the latter being indeed identical chassis to those upon which touring car bodies are applied. There is a noticeable trend, however, toward following truck practice in the design of even the smallest of our commercial vehicles.

This is due to the fact that delivery vehicles are never called upon to sustain such high speeds as are demanded for passenger cars while they are required to cover very much more ground in a day. Ruggedness and greater weight are, therefore, much to be desired for delivery vehicles which are to see severe service.

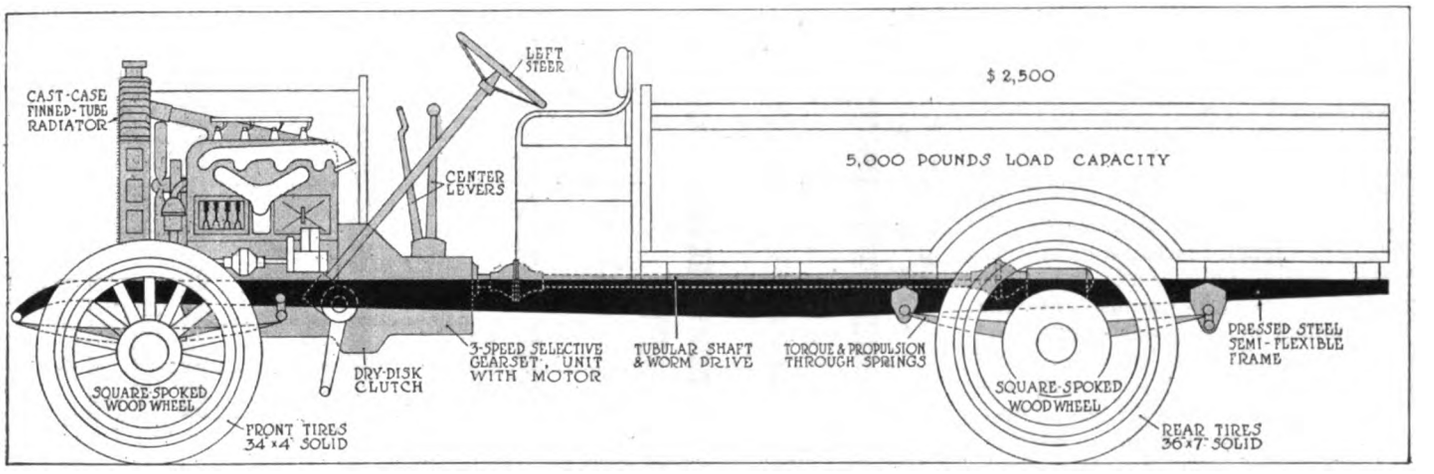
Two years ago, the 1000-pounder was much in the public favor and a great number of these were built. Some of them were very light and were designed for package work where the weight of the load was a negligible factor and cheapness and speed were the prime requisites. Others were very elaborate and were designed for the severest sort of service, including overloading.



Various methods of final drive illustrated and compared as to percentage of models using them for 5 years, irrespective of number of chassis of given model produced

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The Tendency of 1917 Trends



The composite of the most popular developments in truck design for 1917, representing the spirit in design over a period of 5 years, as determined by specifications published for 1913, 1914, 1915, 1916 and 1917. This estimate is by no means a prediction of future standards, but represents the tendency, without reference to the popularity from a production standpoint, of different constructions: Motor, under hood, cylinder cast in block, four cylinders, L-head with three bearings. Bore 4, stroke 5 1/4 horsepower, 25.6 by formula. Lubrication by splash-pressure system. Centrifugal pump water circulation. Single ignition with high-tension magneto and hand spark advance. Centrifugal motor-driven governor limits speed to 1,221 r.p.m. or 15 miles per hour

Experience has shown that many of these were used for ¾-ton loads and that their owners preferred them to 1500-pounders because they were lighter and cheaper to operate. This has resulted in minor changes in the design of many of these to adapt them to 1500-pound loads.

Similarly the erstwhile ¾-tonner has in many cases been promoted to the 1-ton class.

Ratings Increased

Among these may be mentioned the Bessemer, Denby, Republic, whose former ¾-tonner has been revised for 1-ton loads, a brand new 1500-pounder having just appeared, the Sanford, and the Diamond-T.

Somewhat the same change is noticeable all through the range of capacities, accountable largely to the fact that owners are a little less prone to overloading their vehicles, having learned from experience. Dealers are learning to gage the requirements of buyers better and to recommend fearlessly trucks of ample capacity instead of claiming unreasonable overload capacity for their wares. Manufacturers are building more intermediate capacities so that the owner is not tempted to choose the smaller of two trucks for a load midway between their capacities.

Denby has raised the capacity of its full line ½ ton with the exception of the smallest, raised 500 lb. Kelly capacities have been readjusted. Krebs 1- and 3-tonners have been made 1½- and 3½-tonners. The 1- and 2-ton Maccars, the 1-ton Republic, the 1-ton Sanford, the 2-ton Sterling and 1½-ton Diamond-T have all been revamped for 1000-pound extra capacities.

Intermediate Capacities

Capacities change but little year by year, due to the necessary conservatism in making radical changes in this respect, but a survey of developments in the last 5 years shows that the greatest gains have been made in two intermediate models, the 2½-tonner, a comparatively recent development, and the 3½-tonner which has been gaining steadily for years. The 3-tonner

Trends in Truck Design

Features	AVERAGE DESIGN					GREATEST GAINS				Tendency for the Future
	1913	1914	1915	1916	1917	1914	1915	1916	1917	
Capacity, tons	2 1/2	2 1/2	2 1/4	2 1/2	2 1/2	1	1 1/2	2	2 1/2	2 1/2
Price	$3500	$3058	$2528	$2413	$2550	*lower*	*lower*	*lower*	*higher*	steady
Tires, kind	solid	solid	solid	solid	solid	.....	*pneumatic*	*steel*	*pneumatic*	solid
Size, front	.....	36x4 single	35x4 single	35x4 1-2 single	34x4 single	.....	.....	.....	*smaller*	smaller
Size, rear	.....	36x3 1-2 dual	36x3 1-2 dual	38x6 single	36 x3 1-2 dual	*single*	*single*	36 *single*	35 *dual*	smaller single
Motor location	under hood	under hood	under hood	under hood	under hood	*between seats*	*under hood*	*under hood*	*under hood*	under hood
Cylinders	four	four	four	four	four	*four*	*four*	*six*	*six*	four
Valves	side	side	side	side	side	*side*	*side*	*side*	*side*	side.
Bore	4 1/4	4 1/8	4 1/6	4	4 1/10	*smaller*	*larger*	*smaller*	*larger*	steady
Stroke	5 1/4	5 1/4	5 1/4	5 1/5	5 1/3	.....	.....	*shorter*	*longer*	steady
N.A.C.C. horsepower	28.9	27.20	27.6	25.6	26.5	*less*	*more*	*less*	*more*	steady
Cooling	pump	pump	pump	pump	pump	.....	.....	*thermo-syphon*	*gear pump*	centrifugal pump
Ignition, magneto	dual	dual	single	single	single	*single*	*single*	*single*	*single*	single
Spark advance	hand	hand	hand	hand	hand	*automatic*	*fixed*	*fixed*	*fixed*	fixed
Final drive	chain	chain	chain	worm	worm	*worm*	*worm*	*worm*	*worm*	worm
Steering	right	left	left	left	left	*left*	*left*	*left*	*right*	left
Levers	right	center	center	center	center	*center*	*center*	*center*	*center*	center
Propulsion	radius rods	radius rods	radius rods	radius rods	springs	*springs*	*springs*	*springs*	*springs*	springs
Torque	.....	.....	.....	springs	springs	.....	*springs*	*springs*	*torque-arm*	springs

Based on specifications published in THE COMMERCIAL VEHICLE for 5 years, irrespective of the number of trucks of given model sold.

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and the ¾-tonner have been losing steadily, since these capacities were set arbitrarily by manufacturers before the industry had built sufficient trucks to really know what was demanded.

Light Models Cost More

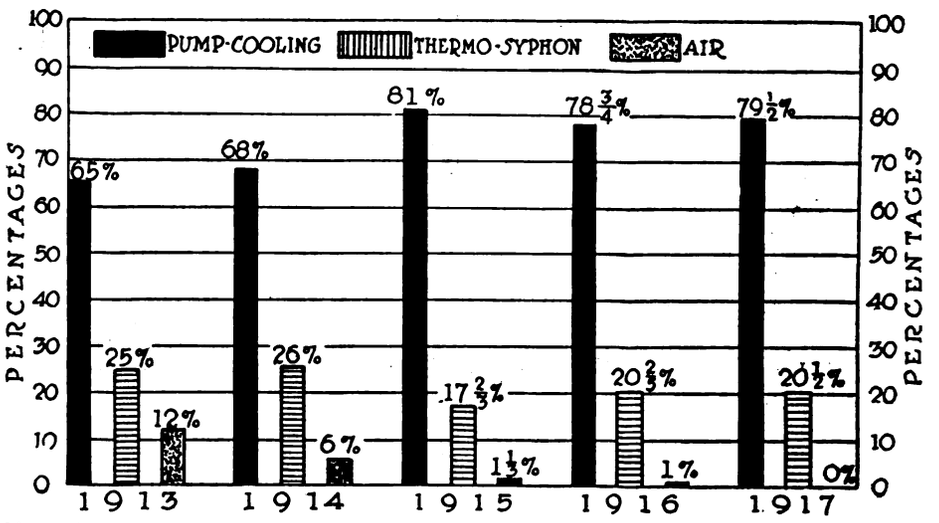
The price change this year has only amounted to an average of $137, most of the models being increased but little. The trucks of less than ½ ton and of ¾ tons capacity have been the ones whose prices have undergone the greatest increases because of the abandonment of many antique designs in these capacities in the face of the popular demand for better quality and stamina in the low capacities. These trucks average much higher, but they are also immeasurably better vehicles than were formerly offered, and to-day one may buy a truck of ½ or ¾-ton capacity which will give the same reliable and enduring service as the best of the heavy trucks.

That it has principally been the small to medium assembler who has been obliged to increase his prices is an instructive phase of the situation. This is undoubtedly because the large manufacturers, building a considerable percentage of their trucks in their own plants, such as Packard, Pierce-Arrow, Peerless, Riker and White have been able to secure raw materials sufficiently in advance to prevent any serious shortage, and, making their own motors, clutches, gear boxes and axles have not been affected by the shortage of some of these components occasioned by labor troubles in the plants of parts manufacturers.

The Material Shortage

The large assemblers have also in most cases escaped serious curtailment of production or delay of deliveries because their orders were of such size as to give them precedence over smaller concerns in the parts markets. Not all of the big assemblers have had this good fortune, however, and some have found the supplies of parts too precarious for comfort.

As a possible avoidance of this danger, a few have undertaken to do more manufacturing in their own plants and even the smaller builders have installed more machinery for the simpler machining operations instead of having this work done outside on contract.



Air cooling is dead, but thermo-syphon water circulation holds its own, though in the minority

Derivation of Trends

In the foregoing and following discussions of trends, and in the trend tables presented herewith it is necessary to understand that the averages and percentages upon which these conclusions are based are derived from analysis of the specifications published elsewhere in this issue, and as such, of necessity, must contemplate only the relation of models produced to each other, irrespective of the number of chassis of given model which are produced.

The average capacity, therefore, is found to be 4924 pounds, but a review of previous remarks on production will show that of actual vehicles sold, the average capacity must be considerably lower than this. This phase of the subject need not be discussed,

TRUCKS USING HOTCHKISS DRIVE

*Acason
Acme
*Atlas
*Atterbury
*Autocar
Available
Bessemer
Brinton
Brockway
Burford
Chase
*Clyde
Coleman
*Columbia
Commerce
*Continental (C)
*Corbitt
*Croce
*Dart
*D-E
*De Kalb
*Denby
*Denmo
Diamond-T
Dorris
*Dominion Tractor
*Fargo
*Forschler
Gabriel
Garford
*Gersix
*Globe
G. M. C.
*Gramm-Bernstein
Hahn
Hall
*Harvey
*Hawkeye
*Henderson
Hurlburt
*I. H. C.
*Independent
Indiana
*Jeffery
*Kisselkar
Kleiber
*Koehler
Krebs
*Lane
*Landshaft
*Larrabee
*Lippard-Stewart
Little Giant
Mack
Moreland
Modern
*Netco
Niles
Old Reliable
Palmer
*Paulding
Peerless
*Pennsy
*Rainier
*Republic
Rowe
Royal
*Rush
*Salvador
Sandow
Sanford
Selden
Service
Signal
*Stegeman
Sterling
*Stewart
Sullivan
Superior
*Thomas
Tiffin
*Transport Tractor
*Union
*United
U. S.
Velie
*Vim
*Walter

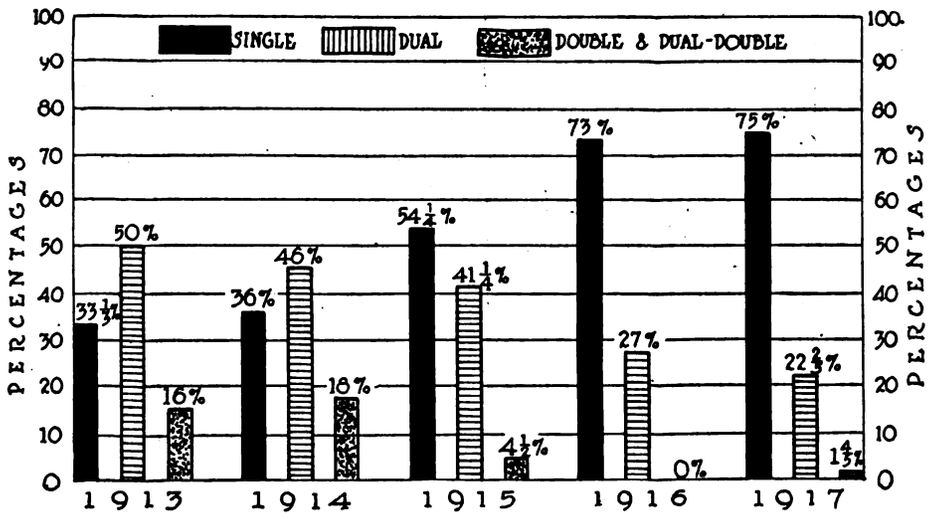
*Indicates that all models of the trucks so designated employ Hotchkiss drive.

The Trend in Load Capacity

Tons	NUMBER OF CHASSIS					1917 GAIN-LOSS		3 YEARS' GAIN-LOSS	
	1913	1914	1915	1916	1917	Number	Per Cent	Number	Per Cent
Less than ½	13	15	19	8	3	− 5	−62.5	−10	− 76.4
½	19	28	31	28	19	− 9	−32.2	.....	.....
¾	47	48	44	40	23	−17	−42.5	−24	− 36.2
1	59	72	68	65	54	−11	−16.8	− 5	− 84.6
1½	46	50	66	54	45	− 9	−16.6	− 1	− 2.2
2	62	62	76	93	70	−13	−17.2	+ 8	+ 12.9
2½	5	10	19	17	29	+12	+70.5	+24	+480.0
3	55	48	43	33	20	−13	−39.4	−35	− 62.5
3½	14	14	28	38	48	+10	+26.4	+34	+253.0
4	19	17	16	14	12	− 2	−14.3	− 7	− 36.8
5 and 5½	49	44	45	43	42	− 1	−23.2	− 7	− 14.3
6 and 6½	9	16	18	14	9	− 5	−35.7	.....	.....
7 and over	6	8	12	10	7	− 3	−33.3	+ 1	+ 16.6
Tractors	.....	.....	.....	12	8	− 4	−33.3	.....	.....

Based on specifications published in THE COMMERCIAL VEHICLE for 5 years, irrespective of the number of trucks of given model sold.

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Double systems reappear, but the single system continues to lead the dual a merry chase

Wichita
*Wilcox
*Wilson
*Witt-Will
*Wisconsin
*W. S.
*Zeitler & Lamson

TRUCKS USING FOUR-WHEEL DRIVE

Beech Creek
Couple-Gear
Duplex
F. W. D.
Jeffery
Robinson
Walter
Ware
W. S.

TRUCKS USING FRONT-WHEEL DRIVE

A & B

TRUCKS USING FOUR-SPEED GEAR-BOXES

*Acason
*Atterbury
*Barker
Burford
Chase
Dart
Diamond-T
*Dispatch
Federal
Gabriel
Garford
*G. V.-Mercedes
G. M. C.
Gramm-Bernstein
Hall
*Harvey
Hurlburt
Jeffery
Kisselkar
Kleiber
*Krebs
Maccar
Moreland
Old Reliable
Peerless
Republic
*Riker
*Rowe
*Saurer
Schleicher
Selden
Service
Signal
Sterling
*Transport Tractor
United
*Velie
*Walter
*Watson Tractor
*White

*Indicates that all models of trucks so designated employ four-speed gear boxes.

however, since this article is only concerned with the technical progress which has been made during this year, and this is only truly reflected by the variety and similarity of designs executed.

Electric Lighting and Starting

A development which has been long in coming but which may be said to be with us to-day is the provision of automatic starting means for the truck and of electric lights. This comes as an expected development, if not one somewhat overdue. It was predicted by this publication at the close of last year. Formerly electric lighting and starting was principally confined to the lighter vehicles, but for 1917, out of thirty-eight manufacturers fitting electric lighting or starting and lighting systems as stock equipment, more than half are of medium to heavy capacity. Prominent among these are the Commerce, Gersix, Hurlburt, Jeffery, Knox, Larrabee, Old Reliable, Studebaker, Thomas, Denmo, Stegeman and Wilcox.

Two factors have retarded this development more than anything else—technical difficulties and cost. Owners were willing, nay anxious, to use electric light, and while they had no especial desire for it, they certainly had no objection to electric starting, but they balked at the cost when legal lighting requirements could be met with kerosene and acetylene lights and mechanical starting meant in many cases nothing more than convenience to the driver. They also demanded reliability and simplicity.

Early Difficulties

Heavy trucks on solid tires are subject to great vibration, and many of the early attempts to fit electric starters designed for pneumatic-tired delicately-sprung passenger cars to trucks resulted in no end of trouble. The battery in some cases gave trouble. The need was for a special outfit designed ruggedly enough to withstand truck service. Starter makers hesitated to undertake the expensive work of developing such equipment until they had a little more assurance of a real demand.

In the meantime it became evident that electric starting and lighting, in the case of the delivery truck, was in many cases a crying need and that the cost of installation was petty compared with the possibilities of economy by its use. Vehicles in package work are obliged to make a large number of stops per day, a department store vehicle often making as many as 100 on a single trip, of which there may be two or three.

Why the Starter?

To crank the engine by hand this many times would involve so much time as to seriously cut down the work of the truck for that day and would involve an amount of physical exertion on the part of the driver calculated to have a deleterious effect upon his efficiency.

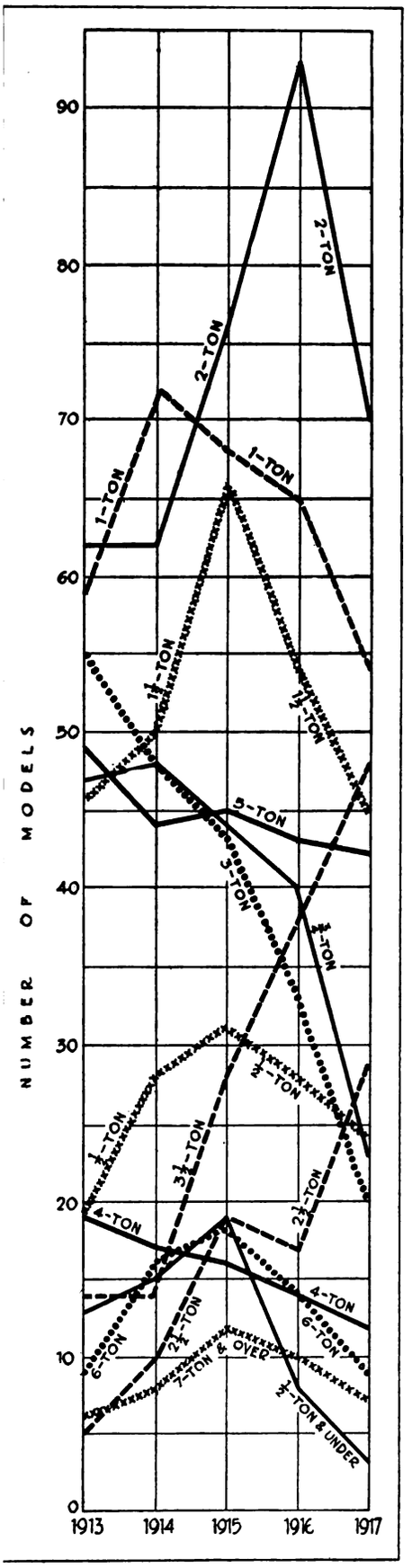
If, as is usually the case, the motor is left running at each stop, which will possibly average from 1 to 2 minutes, much fuel and oil are consumed, the motor misses a much-needed opportunity to cool, in many cases, and

The Trend in List Prices

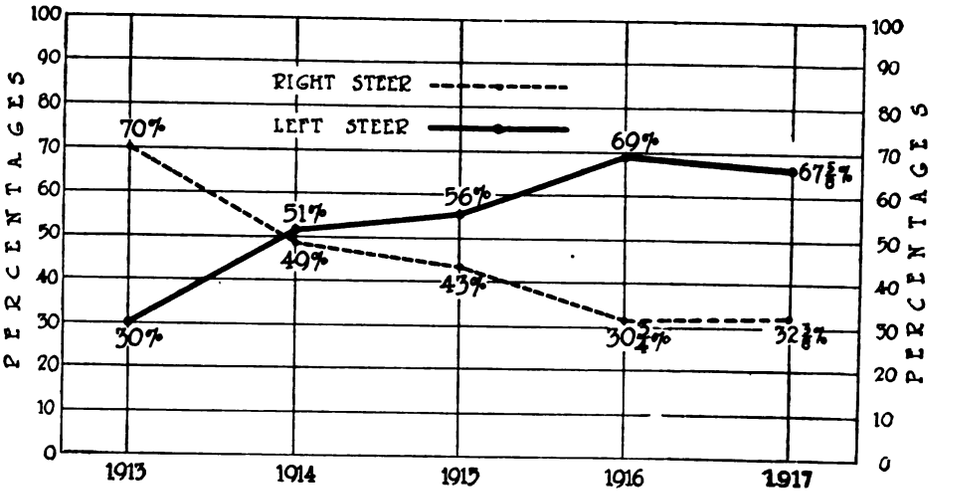
Tons	AVERAGE PRICES					1917 GAIN-LOSS		4 YEARS' GAIN-LOSS	
	1913	1914	1915	1916	1917	Amount	Per Cent	Amount	Per Cent
Less than ½	.....	.....	$439.50	$429.17	$503.33	+$74.16	+16.8	.....	.....
½	$1,527.77	$1,002.00	862.77	766.43	760.59	− 5.84	− .7	−$767.18	−50.2
¾	1,358.33	1,453.16	1,328.99	1,234.00	1,802.61	+568.61	+46.0	+ 444.28	+32.7
1	1,759.39	1,690.55	1,660.98	1,642.17	1,467.80	−174.37	−10.6	−291.59	−16.6
1½	2,345.53	2,034.33	2,057.54	2,004.32	1,266.02	−738.30	−36.8	−1079.51	−46.0
2	2,635.36	2,565.48	2,433.27	2,287.93	2,114.47	−173.46	− 7.6	− 520.89	−19.8
2½	2,950.00	2,957.14	2,740.00	2,481.21	2,524.10	+ 42.89	+ 1.7	− 425.90	−14.4
3	3,095.88	3,323.33	3,271.32	3,147.73	3,356.25	+108.52	+ 3.5	+ 260.37	+ 8.4
3½	3,837.50	3,437.50	3,489.77	3,276.43	3,252.33	− 24.10	− .8	− 585.17	−15.7
4	3,841.66	3,877.77	3,337.50	3,417.50	3,170.45	−247.05	− 7.8	− 671.21	−17.5
5 and 5½	4,366.66	4,350.00	4,312.90	4,311.36	4,181.08	−130.28	− 3.0	− 185.58	− 4.2
6 and 6½	4,970.00	4,743.75	4,915.38	4,555.55	4,725.00	+169.45	+ 3.7	− 245.00	− 4.9
7 and over	5,600.00	4,420.00	4,394.44	4,687.50	4,825.00	+137.50	+ 2.9	− 775.00	−13.9
Tractors	.....	.....	.....	3,825.00	3,862.50	+ 37.50	+ 1.0	.....	.....

Based on specifications published in THE COMMERCIAL VEHICLE for 4 years, irrespective of the number of trucks of given model sold

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Number of models of different capacity offered on the American market during 5 years. Note sharp decline in 2-, 1-, 1½-, ¾-, ½-, and under ½-ton models and the rise of the 3½- and 2½-tonners during the last year



What is the matter with the left steer? This is one of the surprises of the year

the danger to other occupants of the road is much increased unless, as the law requires in most localities, the truck is attended constantly.

Last year witnessed the application of electrical starting and lighting equipment to a large number of delivery vehicles, and buyers received them favorably. Starter makers also learned what was necessary to make their outfits adaptable to the severe duty required, so that to-day we have electric starting and lighting systems which are actually producing results on solid-tired vehicles.

Right Steer Returning

In the design of trucks there have been several contradictory tendencies. For example, after a three-year period during which the left-steering-wheel position came into prominence and bade fair to oust the right drive entirely, this rapid progress has been stayed and a less percentage of trucks have left drive for 1917 than was the case for 1916.

Among those who have foresaken left steer either throughout their lines or on their newer models are the makers of the Chase, the Koehler, Krebs, Little Giant, Selden, U. S., Universal and Watson.

This condition has been influenced to some extent by European orders, which, of course, require right steer, but there has been a well-defined insistence on the part of American buyers in some classes for right steer. This is especially the case with road contractors and others who operate their trucks on country roads, since it is very difficult for the driver of a left-steered truck to determine how closely he may approach the ditch on the right side, and with the present prevalent narrowness of improved country roads and the concealed ditches this argument becomes a weighty one.

The improvement of truck design has extended even to the framework. In former years few gave any special thought to the frame of a motor truck, deeming that its office was to be strong enough to carry the load and stiff enough to keep the parts in their proper relation. Lately, however, the advantages of the flexible type of construction have been realized to a greater extent, and while many makers still adhere to rigid construction, relying on the springs entirely for compensation for axle movement, there is an increasing number who are adopting the flexible forms. The majority of makers are using what may be termed the semi-flexible form of frame, usually of pressed steel and yielding to severe stresses while remaining stiff against minor ones.

The steel wheel is once more in evidence, this time in a fewer number of forms, the cast type predominating. Doubtless the difficulty of getting wood wheels for part of the time this year has had its influence, but it is safe to predict a growing application of steel wheels to the heavier capacities.

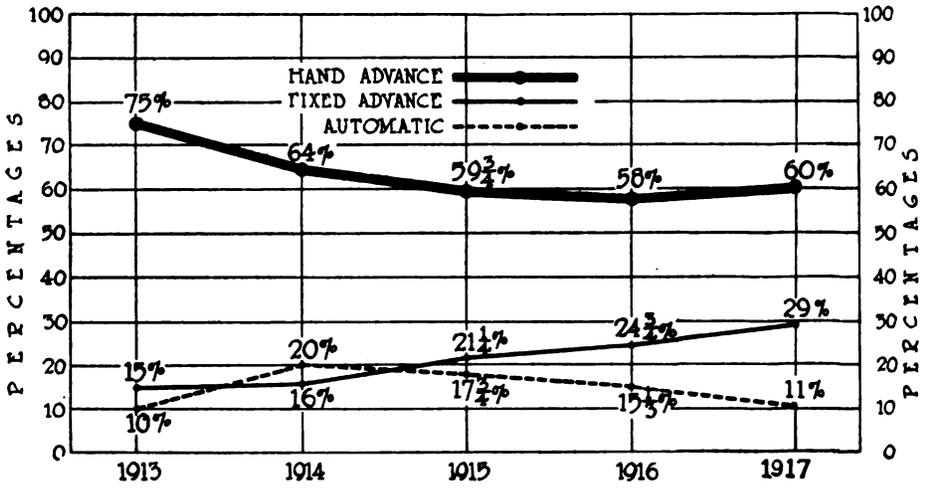
Federal, Gramm-Bernstein, Knox, Republic, Walter and Zeitler & Lamson trucks have recently had steel wheels substituted for wooden ones as standard construction.

In wood wheels, the square spoke is the most popular type, since it affords a wider bearing on the felloe and is actually cheaper to manufacture than the older oval type.

Single Tire Enigma

The dual tire, after being outnumbered by the single, on the rear wheel, in the year 1915, has regained its advantage in the 1917 models. This is hard to account for, but no doubt is due to popular prejudice against wide single tires. The single rear tire, however, is gaining, nevertheless, in a way that does not show itself in the tables. Users of trucks all over the country are replacing dual tires with

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Hand advance prevails pending settlement of the issue between fixed and automatic spark systems

singles and many of the manufacturers who provide dual tires as standard equipment find many users who are willing to pay a slight additional charge for single-tire equipment all around.

Failure of more manufacturers to put large pneumatics on trucks from 1 ton upward is disappointing, although with the great activity and favorable opinion on the part of many of the tire makers there is good grounds for the expectation that before 1918 a number of models of 1½ and 2 tons capacity will appear with pneumatic equipment.

Cast Radiators Gain

The cast radiator casing which last year showed marked gains has not gained as much as expected. This is also hard to account for, since it has been demonstrated that the cast casing is better able to withstand the shocks, bumps and strains incident to truck service than is the passenger car type. The only explanation that can be advanced is that a shortage of materials has made it necessary for makers to adopt the sheet-metal casing temporarily until cast ones were again available. Cost, too, may have had something to do with it, since with other costs all rising, some makers have doubtless undertaken to save by purchasing less expensive radiators, since the sheet-metal one is capable of giving satisfactory results if not unduly abused.

Five makers who were formerly firm advocates of the cast radiator casing have put out new models using sheet-metal ones, these being Croce, Federal, Knickerbocker, Larrabee and Moreland.

Anent Spark Advance

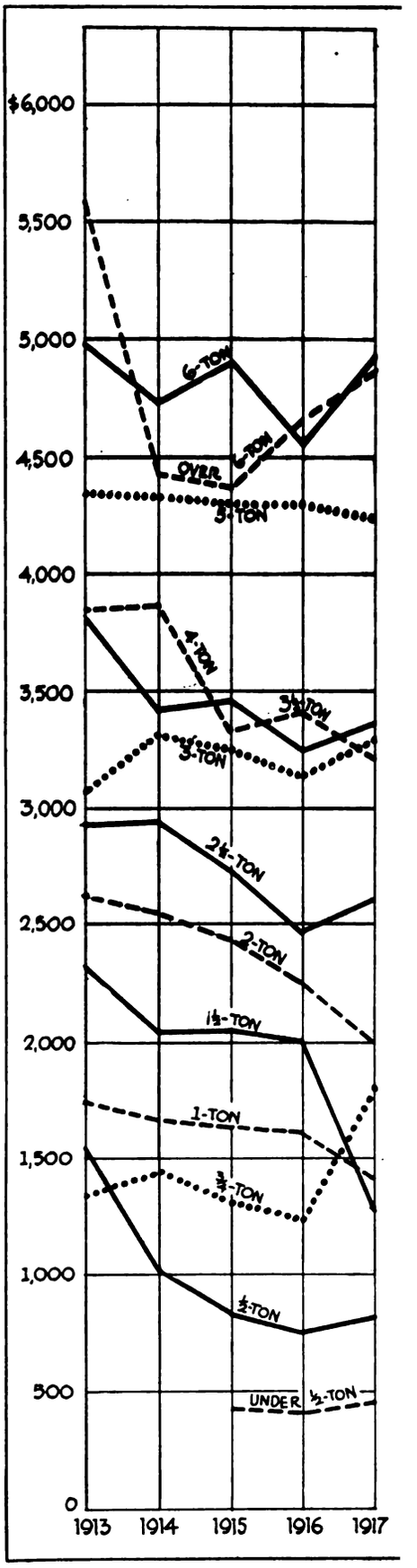
Automatic spark advance which it seemed at one time would become prevalent has not progressed of late, due probably to its cost, although appliances of lower cost are being developed. It would also seem a simple matter to use the same centrifugal governor which most trucks use to control the engine speed to take on the extra duty of advancing the spark.

That both hand advance and fixed-spark systems continue to have strong adherents seems to show that each has advantages not possessed by the other, and only combined in the automatic system. The hand advance permits greater economy of fuel, if properly handled than the fixed spark does, and permits the engine to pull better in difficult going. The fixed spark, however, is fool-proof and does not subject the engine to the wasteful abuse incident to improper handling of a hand-spark advance.

Bravo, Hotchkiss!

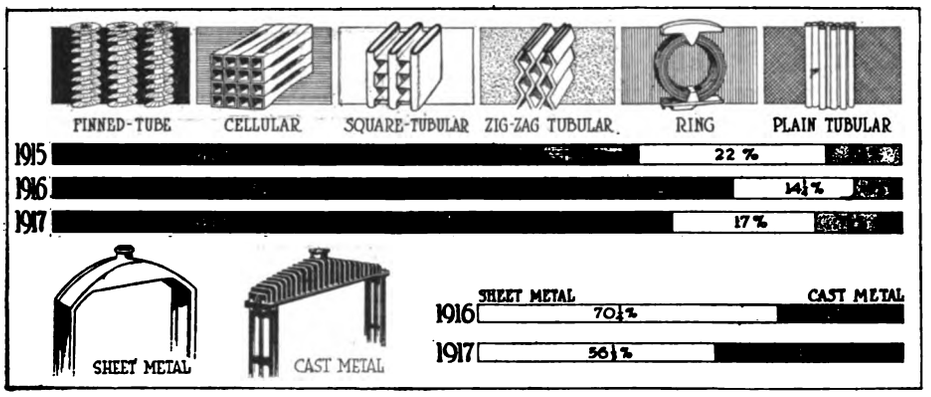
Hotchkiss drive has been steadily coming and to-day it is in the majority. There are a number of makers who use Hotchkiss drive, that is, the taking of axle torque and thrust through the vehicle springs, even on 5-ton and 6-ton trucks; but in the majority of instances its use is confined to trucks of medium capacity. This is because the thrust or propulsive duty on the spring assumes such great proportions in a heavy truck that nothing but the best type of spring with especially large and rugged pinning at the driving end can give satisfaction. During the year, several makers have removed radius rods from some of their models, however, due, possibly, to a better understanding of requirements for Hotchkiss drive.

Most of the new makes which have appeared during 1916 have had Hotchkiss drive in addition to which new models of the following makes, most of which formerly employing radius rods or torque members or both, have incorporated drive through the



Through the years the price trend has bee consistently downward with few exception but 1917 sees a general increase for the firs time. Note that prices have increased o two models to one showing a decrease

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Tendencies in radiator construction—At the top will be found sketches showing differences in core construction, on backgrounds of different shadings to correspond with the graphs below showing the relative popularity of the different types as shown by models represented in the specification tables published in this publication for the three years shown. Below are shown the two types of radiator casings with corresponding graphs

springs: Commerce, Dart, Hurlburt, Jeffery, Kisselkar, Little Giant, Moreland, Old Reliable, Republic, Royal, Selden, Stegeman, Stewart, Tiffin and Wilcox.

Unit Power Plant Losing

Associated with this trend has been development in regard to driveshafts. It has been the ideal of many designers for some time to reduce the truck chassis to the same simplicity which is noticeable in the newer designs of passenger cars, by means of unit power-plant grouping of the engine, clutch and gearset and final drive by a single shaft with two universals.

Difficulties, however, have been encountered in the excessive length of such driveshafts due to the long wheelbases possessed by the medium to larger trucks. Passenger car methods cannot be pursued here as small, solid shafts of such length are prone to whip and whirl, rapidly playing havoc with the universals, axle bearings and gearbox bearings. Accordingly much experimenting has been done with shafts made of large-diameter tubing, which with greater strength and little if any greater weight, are much stiffer than solid shafts. Remarkably good results have been achieved on wheelbases of considerable length, but for the longest wheelbases it has so far been imperative that the shaft be cut into two lengths with a stationary bearing between the sections.

Shortening Shafting

Some makers have provided this bearing at about the middle of a two-part shaft, others splitting the shaft by interposing the gearbox between its two sections. This latter practice has given rise to a decrease in unit powerplant assemblies and increased the percentage of makers who locate their gearsets amidships. Some of these, who have recently brought out new models with amidships gearsets where formerly they favored unit powerplant assembly are: Old Reliable, Signal, Wilcox, Dayton and Diamond-T.

The disinclination of the American operator to shift gears more often than avoidable is reflected in the failure of the four-speed gearset to make more progress. It has, in fact, lost slightly in favor of the three-speed, despite the recognized fact that four-speed gearsets give the truck greater ability in difficult going and particularly in hilly country.

Somewhat of the same effect has been accomplished, however, by a slight increase in the size of engines and slightly greater gear reduction. More of the makers than ever are fitting governors, their undoubted tendency to restrict power on the lower speeds being avoided in an increasing number of cases by driving them from the driveshaft instead of the motor or by using the combination drive from both the motor and driveshaft.

Driving the Governor

For example, Armleder, Old Reliable and Service models which formerly did not have governors have for 1917 been equipped with the driveshaft-driven type. The Couple-Gear and Studebaker, formerly without governors, are now provided with the front-wheel driven type. New models of the Commerce, Globe, Old Reliable and Denmo have driveshaft-driven forms and duplex-driven governors have been adopted recently by Old Reliable, Thomas and Zeitler & Lamson.

Another development of the past 2 years which has been a surprise has been the appearance of vehicles with six-cylinder engines.

There have been two reasons for the adoption of the six-cylinder truck engine. Among the first to use six cylinders for trucks were makers who desired to produce heavy trucks or high-speed ones for fire apparatus work for which there were no stock

TRUCKS USING GOVERNORS DRIVEN OFF THE DRIVESHAFT

Armleder
Commerce
Denmo
Globe
Menominee
Service
United

TRUCKS USING GOVERNORS DRIVEN OFF BOTH THE MOTOR AND DRIVESHAFT

Dart
Duplex
Harvey
Jeffery
Old Reliable
Thomas
Zeitler & Lamson

TRUCKS USING GOVERNORS DRIVEN OFF FRONT WHEEL

Couple-Gear
Studebaker

TRUCKS USING CAST-CASE RADIATORS

*Acason
Acme
Armleder
*Atterbury
Bessemer
*Brockway
*Burford
Chase
*Clyde
*Columbia
*Commerce
*Continental (C)
*Corbitt
*Dayton
*Denby
*Doane
Federal
Garford
G. A. Schacht
*G. V.-Mercedes
*Gersix
*Globe
G. M. C.
*Gramm-Bernstein
*Hall
*Hawkeye
*Horner
Hurlburt
*Koehler
*Krebs
*Lane
Larrabee
*Lincoln
Lippard-Stewart
Mack
*Manly
Menominee
Moreland
*Netco
*Palmer
*Palmer-Moore
*Pierce-Arrow
Reo
*Republic
*Riker
*Royal
*Rush
*Sanford
Selden
*Service
*Signal
Stegeman
*Sterling
*Union
*United
Universal
*Velie
*Walter
*Watson
*Wichita
Wilcox
*Wilson
*W. S.
*Zeitler & Lamson

*Indicates that all models of the trucks so designated use cast case radiators.

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motors of the make to which they were accustomed of sufficient power in the four-cylinder range.

Since then they have abandoned the six, having been able to secure larger fours. Gramm-Bernstein is an example of this, who, having used the six as a temporary expedient, has since been able to substitute larger fours. On the other hand, there are concerns which this year have adopted the six for larger models, among whom are Hurlburt and Tiffin.

The Stegeman company, which last year tried the six-cylinder motor on its largest model, this year has produced and for 1917 is continuing a line ranging through four models from 1½ to 5 tons, every one of which has a six-cylinder motor. Three other trucks, the Gersix and Globe and a new Netco model, are produced with six-cylinder motors by preference.

This undoubtedly puts a new light on the subject, as the reasons advanced for the practice by these concerns are that the six gives a steadier flow of power and therefore racks the chassis less, that it permits the truck to operate with less gear-changing and that it enables the truck to accelerate more rapidly.

These ideas are revolutionary, since it has since time immemorial been accepted that the truck was of necessity a sluggish vehicle; that being on solid tires, it was unavoidably subjected to such severe vibration and racking from the road that any slight engine vibration or irregularity in power output could only be of minor importance; that rapid acceleration is undesirable since it imposes much more severe stresses on driving parts; and that frequent gear-changes make for economy.

On the other hand, setting aside the catholic viewpoint for the moment, it is obvious that if vibration can be reduced where it is reducible, that which is unavoidable will wreak less havoc; that if rapid acceleration can be secured at not too great cost or strain to the mechanism, it is desirable from a standpoint of rapidity of delivery in congested traffic; and that, regardless of the undoubted soundness of the theory that frequent gear-changes are desirable, if the American driver will not change as often as he should, then there is wisdom in providing him with a vehicle that will operate efficiently in spite of his deficiency.

Principal Features of 1917 Design Contrasted by Percentages with Those of 1916 Practice

Frame Materials

	1916	1917
Pressed steel	....	67 1/2
Rolled channel	....	29 1/2
Rolled I-beam	....	2 3/4
Wood	....	1/4

Frame Types

Semi-flexible	....	53
Rigid	....	27
Flexible	....	20

Tire Types

Solid	85 1/2	84
Pneumatic	11 1/4	13 1/4
Pneumatic and solid	....	1 1/4
Cushion	1/2	3/4
Wood	....	3/8
Steel	3/4	3/8

Tire Sizes

Front	35x4 1/2	34x4
Rear	38x6	36x7 1/2
Front, single	97 3/4	99
Front, dual	2 1/4	1
Rear, single	55	48
Rear, dual	45	52

Wheel Types

Wood	....	94
Cast steel	....	5 3/4
Pressed steel	....	1/4

Spoke Shapes

Square	....	64 1/4
Oval	....	29 1/2
Disk	....	2 1/4
Hollow	....	2
Cruciform	....	1 1/2
Cross	....	1/2

No. of Cylinders

Four	96 1/2	97
Six	1	2 1/2
Two	2 1/2	1/2

Engine Size

Average bore	4	4 1/10
Average stroke	5 1/5	5 1/3
N.A.C.C. hp	25.6	26.5

No. of Motor Bearings

With three bearings	....	88
With two bearings	....	8
With four bearings	....	2
With five bearings	....	2

Cylinders Cast

	1916	1917
In block	59	61
In pairs	36 1/3	36
Singly	4	2 1/4
In threes	2/3	3/4

Valve Location

Side	78 1/2	83
Opposite	14	12
Side and head	3 3/4	3/4
In head	3	4
Top, two-cylinder	3/4	1/4

Water Circulation

Centrifugal pump	75 3/4	75
Thermo-syphon	20 1/4	20 1/2
Gear pump	3	4 1/2

Radiator Core Type

Finned-tube	51 1/2	41
Cellular	29 1/4	32
Square-tube	14 1/4	17
Zig-zag-tube	4	7 1/2
Ring	1	1 1/2
Plain tube	....	1

Radiator Case Type

Sheet	70 1/4	56 1/3
Cast	29 3/4	43 2/3

Ignition

Single	73	75 4/5
Dual	27	22 2/5
Double	....	1
Dual-double	....	4/5

Spark Advance

Hand	58	60
Fixed	24 2/3	28
Automatic	15 1/3	11
Two-point fixed	1 1/2	1

Electric Auxiliaries

Starting and lighting	....	47
Lighting	....	25 2/3
None	....	16
Starting, lighting and ignition	....	7 1/6
Starting only	....	2 1/6
Lighting and ignition	....	2
Stock systems	....	18 4/5*
At extra charge	....	29 3/5*
Average extra charge	....	$156

*Percentage of all models.

Governor Types

	1916	1917
Centrifugal	59 1/4	71 3/5
Suction	32 3/8	21 4/5
Loose-ball	7 1/4	5 3/5
Hydraulic	3/4	1
Models, with governors	76 1/2	80
Without governors	23 1/2	20

Governor Drive

From motor	87 1/2	88 1/2
Duplex	5 1/2	5 1/2
From driveshaft	4 1/2	5
From front wheel	1	1

Average Governor Speed

In motor r.p.m.	1,233	1,221
In m.p.h. of truck	15 1/3	15 1/10

Fuel Feed

By gravity	....	84 3/4
By vacuum systems	....	13
By pressure	....	2 1/4

Fuel Tank Location

Beneath seat	....	91
In dash	....	6⅓
At rear	....	⅓
On running-board	....	1⅓

Clutch Type

Dry-disk	48	50 1/2
Cone	26 1/3	24 1/2
Dry-plate	9	14
Disk-in-oil	13	9 1/2
Plate-in-oil	1	1 1/2

Gearset Type

Selective	83 1/2	85 3/4
Individual clutch	7	10
Progressive	5	2 1/4
Electric	1 3/4	1
Friction	1 1/4	1/2
Planetary	1	1/4
Roller	1/2	1/4

Gearset Location

Unit with motor	52 1/4	49
Amidships	29	38
Unit with jackshaft	17 1/2	11 1/2
Unit with axle	1 1/4	1 1/2

Speeds Forward

	1916	1917
Three speeds	76 1/2	79 3/4
Four speeds	20	18 3/4
Two speeds	2 1/2	3/4
Five speeds	....	1/4
Six speeds	....	1/4
Infinite	3/4	1/4

Total Gear-Ratio

Average in high	8 3/4-1	8 7/8-1

Final Drive

Top worm	44 1/2	61 1/2
Double chain	32 1/4	20
Internal gear	12 1/4	9 3/4
Bevel	7 1/4	6 1/4
Spiral bevel	....	1 1/4
Double-reduction	1	1/2
External gear	1	1/2
Roller	1/4	1/4

Propulsion Means

Springs	47 1/4	54 5/8
Radius rods	48 1/2	42 5/8
Sub-frame	1 3/4	1 3/8
Torsion tube	1 3/4	1 3/8

Torsion Members

Springs	81	82 3/4
Torque arm	9 3/4	11 3/8
Torsion tube	6 1/2	2 5/8
Sub-frame	2	1 5/8
Radius rods	3/4	1 5/8

Foot Brake Types

Rear wheel	....	82
Shaft	....	15 3/4
Front wheel	....	1 1/4
Four wheels	....	1
Internal brakes	....	57 3/4
External brakes	....	42 1/4

Hand Brake Types

Rear wheel	....	94
Shaft	....	6
Internal	....	91
External	....	9

Steering Wheel

Left	69	67 5/8
Right	30 3/4	32 3/8

Levers Location

Center	76	80 7/8
Right	18 1/2	13 3/8
Center and right	3	3 1/8
Left	2 1/2	2 1/8
Center and right	....	1/2

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S. A. E. Finds War Truck Standardization a Difficult Undertaking

Committee Fixes Truck Control Arrangements

WASHINGTON, D. C., Oct. 19.—Standard specifications for military motor trucks engrossed a good part of the attention of the Society of Automobile Engineers Standards Committee at its sessions held at the Bureau of Standards here yesterday.

Although it is not at all agreed that standard truck specifications for the army are a good thing, the society has determined to endeavor to see that such standards, if adopted, shall be right. The Truck Standards Division, of which H. D. Church, of the Packard Motor Car Co., Detroit, is chairman, has accordingly drafted a tentative set of ideal military truck specifications whose primary purpose is to provoke discussion and thought. These proposed specifications were the topic of an earnest discussion yesterday afternoon and were literally torn to shreds.

The specifications were prepared by the division to incorporate the best ideas and results of practical experience of its members, to a large measure irrespective of the practice of the different manufacturers whom they represented. It is not expected that such a truck would be produced soon and it is certain that no such truck does exist.

Guided By Britain

They were based upon the experience of Great Britain in its subsidy specification scheme, under which subsidies were granted owners of trucks whose manufacturers built them in conformance with the dictates of the British War Office. They differ, however, in that an attempt has been made to correct some of the more glaring faults in the British scheme revealed by the experience in the war. One of the principles of the British subsidy was that the specifications should call for *ends*, not *means*, requiring interchangeability of the vital parts and leaving the minor components to the designer's discretion, requiring certain degrees of accessibility, certain ability of performance, etc., without dictating what construction should be adopted to achieve such results.

In formulating these specifications, the division aimed to go farther, as war experience has shown that the problem of stocking replacement parts is too much complicated by leniency on the minor points in design.

Henry Souther, of the Ferro Machine & Foundry Co., maintained to the contrary, however, that the specifications should be mainly confined to the results desired, leaving the manufacturer complete latitude as to methods of its attainment except in cases where exact and conclusive data serves as overwhelming proof of the superiority of a particular type of detail construction. He said that he was not at all convinced, for example, that the circulatory system of lubrication, as specified, is essentially superior to other types. He expressed doubts as to the necessity of specifying not less than three main bearings. Cooling requirements, as stated, he opined, were not sufficiently definite, it being his experience that practically no trucks now built are adequate, in this particular, to the duty they are called upon to perform in New Mexican service.

All Trucks Alike

K. W. Zimmerschied, General Motors Corp., on the contrary urged that uniformity of design of trucks for war use is of greater importance than considerations of which particular construction is best. Standardization, in other words, of any fairly good design is preferable to the development of really superior vehicles which are not uniform. This uniformity, thought Mr. Zimmerschied, should extend to the entire truck equipment of an army and not merely to separate companies or divisions.

F. A. Whitten, chief engineer, General Motors Truck Co., partially concurred in this opinion, stating that safety required that safety demands the use of that which is known to be good, regardless of the possible merit of designs not so universally recognized, and suggested even more detailed requirements.

Mr. Souther also pointed out that army truck specifications should require a track to coincide with that of the standard railway gauge to adapt the trucks to service on rails by the simple expedient of fitting flanged wheels or tires.

Details Provoke Contention

Written discussion by John Younger, Pierce-Arrow Motor Car Co., and C. H. Taylor, Republic Motor Truck Co., found flaws in the specifications. Mr. Younger defended the cone clutch, as equal or superior to the dry-disk pattern specified; he stated that full inclosure of all wiring was undesirable and that in many places exposed cables were preferable. He decried the fan belt as a hopeless failure and predicted successful applications of gear drive instead. He objected to arbitrarily requiring an oil capacity of 2 gal. in the motor.

Mr. Taylor doubted the wisdom of requiring radius rods, strongly advocating Hotchkiss drive as more flexible and simple and less likely to give trouble and make noise.

Subject Too Big

A. L. Riker, Locomobile Co., characterized the attempt as a worthy one, but cautioned the division against hasty action. Each separate subject, he thought, should be very carefully and exhaustively investigated before the society committed itself, single paragraphs being proper subjects not for passing comment, but for whole papers.

Mr. Church also presented the complete report on standardized truck controls, which report was approved for submission to general action by the society, with the understanding that the requirements were not intended to require any segment for the spark and throttle levers, but only to fix its position if used. The proposed standards were:

Truck Control Standards

"1—The following recommendations apply to both right and left drive trucks:

"Gearshift and Hand Brake Levers.

"2—It is recommended that the gearshift and hand brake levers be placed at the driver's right, with the hand brake lever to the right of the gearshift lever. The hand brake lever is to be pulled back for brake application. The gearshift lever is to be fitted with a latch guarding the reverse position, or the equivalent of a latch, when used with either a three or a four-speed transmission.

"Gearshift Lever Handle Positions.

"3—It is recommended that for three-speed transmissions the positions of the gearshift lever handle be the same as recommended by the Miscellaneous Division for standardization for pleasure cars (See June *Bulletin*, page 245).

1 3 2 4

Four speed transmissions are to have the forward speeds so arranged that the gearshift handle in high speed is in the same position as with the three-speed transmission, low speed occupying the place of reverse, as shown in the margin. The location of the reverse position is to be left optional. It is further recommended that with either three-speed or four-speed transmissions, the various speeds be clearly indicated, either on the gate or at the base of the gearshift lever.

"Clutch and Brake Pedal.

"4—It is recommended that the clutch pedal be located to the left of and the foot brake pedal to the right of the fore-and-aft center-line of steering column.

"Accelerator Pedal.

"5—It is recommended that the accelerator pedal be placed to the right of the brake pedal.

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"*Spark and Throttle Hand-Levers.*

"6—It is recommended that spark and throttle hand-levers, if used, should be located to the right of the fore and aft center of the steering column. The spark lever should be the shorter of the two and both levers carried on stationary sectors. Both levers should be arranged so that they are pushed forward to advance the spark and to open the throttle."

The standards meeting consumed 2 days, Tuesday and Wednesday, October 17 and 18, the first day being devoted to division meetings and the second to the general meeting of the committee, which had the largest attendance in its history. Dr. Stratton, chief of the Bureau of Standards, in his address of welcome urged that the S. A. E. make full use of the facilities of the bureau for tests and research work and made a strong plea for metric standards wherever possible.

Urges Metric Standards

Speaking of standardization in general, he congratulated the society on being in a new field and able to profit by experience in older fields. He stated that cooperation between practical and scientific men is necessary in working out standards and emphasized the value of scientific testing to intelligent standards work in every field of industry.

His plea for uniform international units of measure was strong and sincere. He stated at length the reasons for his belief that the metric system is the ultimate standard to which all must come and showed by notable examples that the change is not nearly so difficult or expensive as many imagine. He urged emphatically that the society endeavor to incorporate metric measurements in standards established in as far as possible, gradually working toward a universal substitution of metric for British standards.

Proposed Standard Specifications for U. S. Army Trucks

1—The number of trucks required will be stated in the Instructions to Bidders, issued by the Purchasing Quartermaster. The prices quoted will be f.o.b. factory, and the truck must be complete in every respect, and in proper operating condition.

2—*Manufacturers:* Each bidder must submit a complete list of manufacturers and location of factories furnishing any part, either finished or unfinished, assembly, or accessory, which is used in the construction of the trucks, and not made in the factory where the trucks are constructed. This shall not be construed as including bar or sheet stock or structural material. If this information is not given, the proposal may be rejected, or in case the proposal is accepted, the Quartermaster Corps reserves the right to name the manufacturer and select the material, apparatus, parts, or accessories, and no others will be substituted for those named.

3—*Employment of Convict Labor:* In the performance of work herein specified the contractor shall not, directly or indirectly, employ any person undergoing sentence of imprisonment at hard labor, which may have been imposed by a court of any State, territory, or municipality having jurisdiction, nor permit such employment of any person furnishing labor or material to said contractor in fulfillment of this agreement.

4—*Patents:* The contractor shall for all time secure to the government the free and undisputed right to use any and all patented articles used in the work, and shall defend at his own expense any and all suits for infringement of any patent or patents, and in case of adverse claims under patents, the contractor shall pay all awards.

5—*Interchangeability of Parts:* All parts of trucks must be constructed to definite standard dimensions, and proper tolerances, so that any part of same may be replaced and properly fitted and adjusted without requiring additional tool work or machine work on the parts.

6—*Materials:* A complete list of all materials used in the construction of the various parts of the truck must be given, together with the chemical composition, and physical properties of same.

7—*Drawings and Data:* Each bidder will be required to submit complete dimensioned detail and assembly drawings, showing the size and construction of every part of the truck. These drawings must show the shop limits on all parts, and a reference number or letter referred to the list of materials, physical properties, and heat treatment, which list will also be submitted with the proposal. The drawings must be arranged in proper order for filing, and provided with a suitable index which will enable any individual drawing to be readily located. The drawings and data above referred to will not be opened publicly with the proposals, but will be considered confidential. The drawings and data may be submitted direct to the Quartermaster General, Washington, D. C., and should be referred to in each proposal which is submitted.

8—If the drawings and data herein required are on file in the office of the Quartermaster General, they need not again be submitted with the proposal. If any major changes have been made in the construction of the truck, materials used, or methods of heat treatment since the drawings and data were submitted, details of those changes should be submitted with the proposal.

9—*Service Stations:* Complete information regarding the location of all service stations, the floor area of each station, and the number of men employed in each service station, should be submitted with the proposal.

10—*Departure from Specification Requirements:* In case the vehicle on which proposal is submitted does not comply with these specifications, in every particular, the bidder must state definitely in what particulars the vehicle which he proposed to furnish does not comply with specification requirements.

11—*Guarantee:* Each bidder will be required to guarantee his vehicle or vehicles against defects in material or workmanship for a period of 1 year. This guarantee shall include the delivery of the defective part or parts to any point in the United States. After the installation of the new part, the defective part will be returned to the manufacturer if he so requests. The manufacturer will pay the transportation charges on all returned parts.

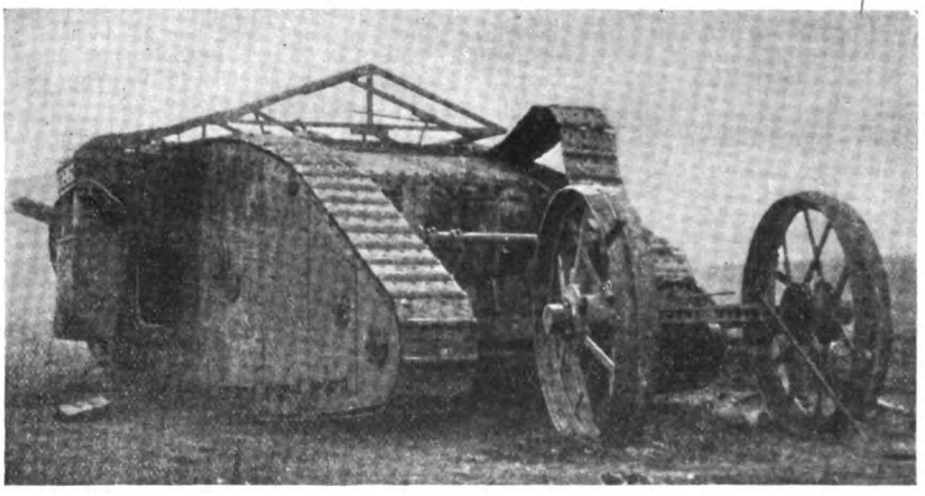
12—*Load Capacity:* The normal load capacity above the chassis, including body, shall be 4480 lb. The maximum load capacity above the chassis, including body, shall be 5080 lb.

13—*Road Speed:* The maximum road speed shall be 14 m.p.h., obtained by maximum motor piston speed on high gear of 1100 ft. per min., limited by governor.

14—*Engine:* Engine shall be located in front, under a hood, and shall be of the four-cylinder vertical type, with a piston displacement of not less than 300 cu. in.

Mechanically-operated interchangeable poppet valves are to be used. Valve stems and springs are to be completely enclosed by

First Photograph of a British War Tank



The above illustration is the first authentic picture of one of the caterpillar armored tractors used by the British Army on the Somme front in France. This machine has been injured by shell fire, or otherwise, as one of the elliptical belts which provide traction is torn out of position as shown at the right. Powerful gears revolve the belts and the weight of the machine is carried on rollers which are set close together on the ground side. The large wheels shown are at the rear, not the front; and help do the steering and support the weight of the tractor when crossing a shell crater or trench, thus greatly increasing its mobile length. Each machine is fitted with three or four machine guns and can fire 2000 bullets a minute, according to reports from the scene of operations

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dust and oil-proof covers which must be readily removable.

Crankshaft must have not less than three main bearings.

Circulating Lubrication

Lubrication must be circulatory, with at least 2 gal. capacity in the oil pan. There shall be pressure feed from the pump to the main crankshaft bearings. If splash is used for connecting-rod lower end bearings, it must be so controlled that the amount of lubrication is not affected by any grade up to 25 per cent, or by a certain transverse inclination. Spray lubrication for other parts of the engine will be acceptable. A screen shall be fitted on the inlet side of the oil pump of a design which will not require cleaning more often than once in each 1000 miles of vehicle operation. A screen must be provided between the crankcase oil-filler and the oil pan, and provision must be made to prevent its ready removal or intentional injury. A settling basin with drain must be provided in the oil pan, and the oil pump inlet must be above level of same.

Ignition by high tension magneto, with battery ignition for starting.

Magnetos must be gear-driven, made to S. A. E. standards, and must be interchangeable in every respect, including mounting. Magnetos must be arranged for *clockwise* rotation and be properly protected from water. For interchangeable magneto specifications see S. A. E. Data Sheet 36, Vol. I.

Timing Marked on Flywheel

To enable the timing of the valves and ignition to be readily set, the flywheel is to be clearly marked for the opening and closing of both inlet and exhaust valves, and for the magneto setting on full retard, and a suitable pointer is to be provided with which the flywheel marks can be aligned when timing the engine.

All ignition wiring must be protected from water and oil and mounted in such a way as to prevent chafing.

Engine must be mounted on a three-point suspension.

Oil pan must be removable without disturbing any of the main bearings or the clutch housing.

Carbureter must be so designed as to properly handle gasoline of the following specifications: (Not settled.) The carbureter must be provided with a readily removable wire mesh gauze strainer in a sediment pocket under the float chamber, and sediment pocket must be provided with a drain cock of the snap-lock type.

Provision must be made to keep dust out of the carbureter air intakes, crankcase breather and oil filler.

Provision must be made to prevent oil leaks at any point in the engine.

To prevent mud and water being spattered up into the carbureter or ignition apparatus, some form of protection must be fitted between the sides of the crankcase and the frame, either in the form of cast webs on the crankcase, or rigidly mounted metal pans extending from the frame sides to the main barrel of the crankcase. Full engine shields extending clear across the frame will not be accepted.

Finned-tube Radiator

15—*Cooling System:* Water cooling must be used, with forced circulation by centrifugal pump, which must be of a design to permit thermo-syphon circulation in event of pump failure.

Radiator must be of the vertical individually finned tube type, with detachable upper and lower tanks. All radiators must be interchangeable and constructed as per drawing. Radiators must be flexibly mounted, to prevent strains from any frame distortion.

A drain-cock which will drain all the water from the entire cooling system must be fitted in a location where a bucket can be readily placed directly beneath the drain. This drain-cock must have a clear bore of at least ⅜ in., and must be fitted with a spring-snap lock to hold it in the closed position.

All suction hose connections must be provided with means to prevent collapsing.

Belt-driven fan shall be used, with a 28-deg. endless V belt of 1¼ in. width, and means of belt adjustment must be provided.

A radiator guard must be furnished in accordance with drawing.

16—*Hood:* Hood with water-proof top must be fitted. Hood must be of a type which can be completely removed or opened up wide for engine inspection or adjustment.

Hood must be supported independently of the radiator.

Folding Starting Crank

17—*Starting-Crank:* Starting-crank must be arranged to fold up when not in use, in such a location that it will not be damaged by minor collisions. Detachable starting-cranks will not be accepted.

18—*Clutch:* Clutch must be of dry disk or dry plate type, with either a spring adjustment, or a spring sufficiently long to automatically compensate for wear on disk surfaces.

The steel clutch disks must be properly hardened.

All thrust must be self-contained when clutch is engaged.

Clutch release must be fitted with ball bearings, with adequate provision for lubrication.

A large clutch brake must be fitted, and the entire clutch and release bearing must be enclosed in a dust-proof housing.

Plain clutch thrust-bearings will not be accepted.

19—*Front Universal Joint Shaft:* If universally jointed shaft is used between clutch and transmission, it must be equipped with two universal joints. Either the metal to metal or fabric disk type of joint will be accepted. In either type, provision must be made to prevent the shaft from whipping loose in event of joint failure. If the joints are of the metal to metal type, they must be thoroughly enclosed, and provision made to obtain lubricant.

Three-Speed Gearset

20—*Transmission:* Transmission must be of the sliding gear type, with four speeds forward and one reverse, the various gear ratios to come within the following percentage limits:

High speed	100%
Third speed	Await suggestions
Second speed	
Low speed	

Reverse: As low as or lower than low speed.

Transmission shaft pilot bearings must be either on ball or roller bearings, as plain bearings at this point will not be accepted.

Transmission must be so mounted as to be unaffected by chassis frame distortion.

Provision must be made to prevent oil leaks at any point.

Sufficient lubricant must be carried for 300 hr. operation without renewal or replenishment.

21—*Propeller-Shaft:* The propeller-shaft must be fitted with two universal joints and a slip joint. The fabric disk type of universal joint will not be acceptable.

Universal joints and slip joint must be completely enclosed, and provision must be made for retaining lubricant.

At the front end of the propeller-shaft, provision must be made to prevent shaft from whipping loose in event of failure of the front universal joint.

22—*Connection Between Rear Axle and Frame:* The driving connection between the rear axle and the frame may be of the type using radius-rods and torque-arm, or radius-rods only, with the springs taking the torque.

Hotchkiss Drive Taboo

The Hotchkiss drive, transmitting both torque and thrust through the rear springs, will not be accepted.

23—*Rear Axle:* The rear axle may be of the worm gear type, or a double reduction gear type with the reduction gearing in a central housing.

The rear axle design throughout must be such as to entirely house all the driving mechanism, and provision must be made to prevent any escape of lubricant.

Sufficient lubricant must be carried in the axle housing for 300 hr. of service without renewal or replenishment.

The differential must be of a type which will drive one rear wheel when the other wheel loses traction.

24—*Front Axle:* The front axle must be a steel forging.

Plain or ball bearings will not be acceptable for the front wheels.

Positive stops must be provided to limit maximum steering angle of front wheels, which must be sufficient to give a minimum turning radius, measured to outside of front wheel track, not to exceed 28 ft.

Steering-knuckle tie-rod must be located behind the front axle. (Many opinions wanted on this.)

Cast Steel Wheels

25—*Wheels:* All wheels shall be of cast steel and interchangeable, although not necessarily identical as to design. Standardized dimensions which will be required are shown on drawing.

Wheels shall be of the proper size to take 36- by 4-in. single front tires and 36- by 4-in. dual rear tires.

26—*Tires:* Solid tires must be used—36-by 4-in. single front and 36- by 4-in. dual rear, S. A. E. standards, of makes either approved by or specified by the War Department.

27—*Tread:* Front, 56-57-in. center to center front tires. Rear, 56-57-in. center to center between dual rear tires.

28—*Springs:* Front and rear springs must be half-elliptic.

Springs shall be equipped with suitable rebound clips, and the second leaf from the top shall be wrapped around the spring eyes to give assistance to the top plate on rebound.

Springs with shrunk-on center bands will not be accepted.

Rubber or spring buffers must be fitted front and rear to cushion blow of frame on axle or spring center under maximum spring deflection.

29—*Wheel Base:* Wheel base must not be less than 11 ft. nor more than 13 ft.

30—*Frame Length:* Frame length back of driver's seat available for body, 10 ft. 5 in.

31—*Load Distribution:* Load distribution arranged to carry between 80 and 95 per cent of load above chassis on the rear tires.

32—*Control:* Control levers, including gearshift lever, brake hand lever, clutch pedal, brake pedal, accelerator pedal and

(*Continued on page* 48)

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Introductory

PRESENTED for the sixth successive year, on following pages are THE COMMERCIAL VEHICLE'S annual specification tables covering gasoline, electric, steam and electric industrial commercial vehicles on the American market.

For 1917, these tables have been published earlier than before, previous specification tables being published always in January or later. The change has been occasioned by the fact that, there being no national motor truck shows in January, manufacturers do not announce new models at any particular time, and thus the occasion for publishing them in the show season disappears. The attention of all is so focused on passenger cars during the show month, furthermore, that it has been deemed preferable to advance the date of publication to a time when readers and the industry generally are in better position to give commercial vehicles the attention and study they require.

Each year the data presented in the specification tables, buyers' guide and directory has been improved and amplified and the utility of the work has become increasingly valuable to all classes of users. A continuance of the efforts of the publishers to make them of intense practical interest and value while at the same time convenient and easy of comprehension has resulted, this year, as in previous ones, in several minor improvements which the old reader will discern and appreciate.

These tables, the standard technical reference of the motor truck industry are designed to be preserved for reference throughout the entire year.

A Directory of Motor Truck Makers

211 Manufacturers of Commercial Vehicles for 1917— 200 Gasoline—Two Steam and Nine Electric— Models Made in Tons Capacity

Name	Manufacturer	Address	MODELS IN TONS CAPACITY *Figures refer to capacity, not number of models*													
			Under ½	½	¾	1	1½	2	2½	3	3½	4	5	5½	6	6½	7 and over
Gasoline Vehicles																	
A. & B	American & British Mfg. Co	Providence, R. I						2		3			5				
Acason	Acason Motor Truck Co	Detroit, Mich						2			3½						
Acme	Cadillac Auto Truck Co	Cadillac, Mich				1		2			3½						
Allis-Chalmers	Allis-Chalmers Mfg. Co	Milwaukee, Wis											5				
American	American Motor Truck Co	Hartford, Conn						2									
Armleder	O. Armleder Co	Cincinnati, Ohio						2			3½						
Atlas	Martin Carriage Wks	York, Pa		½													
Atterbury	Atterbury Motor Car Co	Buffalo, N. Y				1	1½	2			3½						
Autocar	Autocar Co	Ardmore, Pa					1½	2									
Available	Available Truck Co	Chicago, Ill				1		2			3½		5				
Avery	Avery Co	Peoria, Ill				1		2		3			5				
Barker	C. L. Barker	Norwalk, Conn				1		2									
Bauer	Bauer Machine Wks. Co	Kansas City, Mo		½	¾												
Beech Creek	Beech Creek Truck & Auto Co	Beech Creek, Pa								3							
Bell	Bell Motor Car Co	York, Pa		¾													
Bessemer	Bessemer Motor Truck Co	York, Pa				1		2			3½		5				
Blair	Blair Motor Truck Co	Newark, Ohio						2		3		4	5				
Bourne	Bourne Magnetic Truck Co	Philadelphia, Pa															
Brinton	Chester County Motor Co	Coatesville, Pa			¾				2½								
Briscoe	Briscoe Motor Co	Jackson, Mich		½													
Brockway	Brockway Motor Truck Co	Cortland, N. Y				1	1½	2			3½						
Brown	Brown Carriage Co	Cincinnati, Ohio		½													
Bulkley-Rider	Bulkley-Rider Tractor Co	Los Angeles, Cal															T
Burford	H. E. Burford Co	Fremont, Ohio						2			3½						
Carlton	Carlton-Hill Motor Car Co	Rutherford, N. J															
Casey	F. A. Casey	Billerica, Mass		½													
Chase	Chase Motor Truck Co	Syracuse, N. Y				1	1½		2½	3	3½						
Clyde	Clyde Motor Truck Co	Farmingdale, L. I															
Coleman	Coleman Carriage & Harness Co	Ilion, N. Y						2		3							
Collier	Collier Motor Truck Co	Painesville, Ohio			¾												
Columbia	Columbia Motor Truck & Trailer Co	Pontiac, Mich						2									
Commerce	Commerce Motor Car Co	Detroit, Mich			¾	1											
Comet	Comet Automobile Co	Rockford, Ill		½													
Continental (C)	Continental Motor Truck Co	Chicago, Ill				1	1½	2			3½						
Corbitt	Corbitt Automobile Co	Henderson, N. C					1½	2	2½		3½						
Corliss	Corliss Motor Truck Co	Corliss, Wis		½													
Couple-Gear	Couple-Gear Freight Wheel Co	Grand Rapids, Mich									3½		5				
Crawford	Crawford Automobile Co	Hagerstown, Md								3							
Croce	Croce Automobile Co	Asbury Park, N. J		½													
Crown	Crown Commercial Car Co	North Milwaukee, Wis			¾		1½		2½								
Crowther-Duryea	Crowther Motor Co	Rochester, N. Y		¾													
Dain	Dain Mfg. Co	Ottumwa, Iowa				1											
Dart	Dart Motor Truck Co	Waterloo, Iowa			¾		1½		2½								
Dayton	Durable Dayton Truck Co	Dayton, Ohio						2			3½		5				7½

Heavy type represents vehicles whose specifications are given in this issue.

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A Directory of 211 Manufacturers of Gasoline, Steam

Name	Manufacture	Address	MODELS IN TONS CAPACITY (Figures refer to capacity, not number of models)														
			Under ½	½	¾	1	1½	2	2½	3	3½	4	5	5½	6	6½	7 and over
D-E	Day-Elder Motors Co	Newark, N. J		⅜													
DeKalb	DeKalb Wagon Wks. Co	DeKalb, Ill						2	2½								
Denby	Denby Motor Truck Co	Detroit, Mich				1	1½	2	2½								
Denmo	Denneen Motor Co	Cleveland, Ohio		½		1¼											
Diamond-T	Diamond-T Motor Car Co	Chicago, Ill			¾		1½	2			3½						
Dispatch	Dispatch Motor Car Co	Minneapolis, Minn		⅜													
Doane	Doane Motor Truck Co	San Francisco, Cal							2½						6		
Dominion	Dominion Motor Truck Co	Detroit, Mich													6		T
Dornfield	John Dornfield Co	Watertown, Wis															
Dorris	Dorris Motor Car Co	St. Louis, Mo			¾			2									
Duplex	Duplex-Power Car Co	Charlotte, Mich						2		3							
Ellsworth	Mills-Ellsworth Co	Keokuk, Iowa		½													
Erie	Erie Motor Truck Mfg. Co	Erie, Pa															
Fargo	Fargo Motor Car Co	Chicago, Ill				1		2									
Fawick	Fawick Motor Car Co	Sioux Falls, S. D		½	¾	1		2									
Federal	Federal Motor Truck Co	Detroit, Mich				1	1½	2			3½		5				
Forschler	Forschler Wagon Co	New Orleans, La				1		2									
Ford	Ford Motor Co	Detroit, Mich				1											
Frome	R. L. Frome Mfg. Co	Sheboygan, Wis															
F. W. D	Four Wheel Drive Auto Co	Clintonville, Wis					1½			3			5				
Gabriel	Gabriel Auto Co	Cleveland, Ohio			¾	1	1½										
Garford	Garford Motor Truck Co	Lima, Ohio				1	1½	2			3½		5		6		
Gary	Gary Motor Truck Co	Gary, Ind			¾	1	1½	2									
G. A. Schacht	G. A. Schacht Motor Truck Co	Cincinnati, Ohio					1½	2		3							
Geneva	Geneva Wagon Co	Geneva, N. Y			¾												
Gersix	Gerlinger Motor Car Co	Portland, Ore							2½								
Globe	Globe Furniture Co	Northville, Mich				1¼											
G. M. C	General Motors Truck Co	Pontiac, Mich			¾	1	1½	2			3½		5				
Gramm-Bernstein	Gramm-Bernstein Co	Lima, Ohio				1	1½	2	2½		3½		5		6		
Great Southern	Great Southern Automobile Co	Birmingham, Ala						2				4					
G. V.-Mercedes	General Vehicle Co	Long Island City, N. Y													6		
Hahn	Hahn Motor Truck Co	Hamburg, Pa				1		2									
Hall	Lewis-Hall Iron Wks	Detroit, Mich						2			3½		5				
Harrison	Robert Harrison Co	South Boston, Mass									3½						
Harvey	Harvey Motor Truck Co	Harvey, Ill						2			3½		5				
Hawkeye	Hawkeye Mfg. & Repair Co	Sioux City, Iowa				1½											
Henderson	Henderson Bros	North Cambridge, Mass		⅜		1											
Hercules	Hercules Motor Truck Co	South Boston, Mass															
Horner	Detroit-Wyandotte Motor Co	Wyandotte, Mich					1½	2		3			5				
Hurlburt	Hurlburt Motor Truck Co	New York City					1½	2			3½		5				7
I. H. C	International Harvester Corp	Akron, Ohio			¾	1											
Independent	Independent Motors Corp	Port Huron, Mich				1		2									
Indiana	Indiana Truck Co	Marion, Ind				1	1½			3			5				
Inter-State	Inter-State Motor Co	Muncie, Ind	⅜														
Iowa	Iowa Motor Truck Co	Ottumwa, Iowa				1	1½										
Jeffery	Nash Motors Co	Kenosha, Wis			¾		1½	2									
Kearns	Kearns Motor Car Co	Beavertown, Pa		½													
Kelly-Springfield	Kelly-Springfield Motor Truck Co	Springfield, Ohio					1½		2½		3½	4	5		6		
King	A. R. King Mfg. Co	Kingston, N. Y									3½						
KisselKar	Kissel Motor Car Co	Hartford, Wis			¾	1		2	2½			4	5				
Kleiber	Kleiber Co., Inc	San Francisco, Cal				⅞	1½	2	2½		3½		5				
Knickerbocker	Knickerbocker Motor Truck Co	New York City								3	3½		5				T
Knox	Knox Motors Co	Springfield, Mass															
Koehler	H. J. Koehler Motors Corp	Newark, N. J				1											
Koenig & Luhrs	Koenig & Luhrs Wagon Co	Quincy, Ill															
Krebs	Krebs Commercial Car Co	Clyde, Ohio					1½	2			3½						
Kressler	Kressler Auto Co	Fostoria, Ohio		½													
Lambert	Buckeye Mfg. Co	Anderson, Ind				1											
Landshaft	William Landshaft & Son	Chicago, Ill				1		2									
Lane	Lane Motor Truck Co	Kalamazoo, Mich			¾												
Lange	Lange Motor Truck Co	Pittsburgh, Pa					1½		2½								
Larrabee	Larrabee-Deyo Motor Truck Co	Binghamton, N. Y				1	1½		2½								
Lawson	Lawson Mfg. Co	Pittsburgh, Pa		½													
Lenox	Lenox Motor Car Co	Boston, Mass															
Lima	Lima Light Car Mfg. Co	Lima, Ohio		½													
Lincoln	Lincoln Motor Truck Co	Detroit, Mich				1											
Lippard-Stewart	Lippard-Stewart Motor Car Co	Buffalo, N. Y		½	¾	1	1½	2									
Little Giant	Chicago Pneumatic Tool Co	Chicago, Ill			¾	1	1½	2									
Lombard	Lombard Auto Tractor-Truck Corp	New York City											5				
Lord Baltimore	Lord Baltimore Motor Truck Co	Baltimore, Md				1		2									
Maccar	Maccar Co	Scranton, Pa					1½		2½		3½			5½			
Mack	International Motor Co	New York City				1	1½	2			3½			5½			7½
Manly	Manly Motor Corp	Chicago, Ill					1½		2½								
Maxwell	Maxwell Motor Co	Detroit, Mich	¼														
Menominee	D. F. Poyer Co	Menominee, Mich			¾	1	1½	2			3½						
Mercury-Bulley	Mercury Mfg. Co	Chicago, Ill															T
Metropolitan	Metropolitan Motors, Inc	New York City															
Metz	Metz Co	Waltham, Mass		½													
Modern	Bowling Green Motor Car Co	Bowling Green, Ohio				1	1½	2			3½						
Mogul	Mogul Motor Truck Co	St. Louis, Mo					1½	2	2½		3½						
Moon	Jos. W. Moon Buggy Co	St. Louis, Mo					1½										
Moreland	Moreland Motor Truck Co	Los Angeles, Cal				1	1½		2½			4	5				
Morton	Morton Truck & Tractor Co	Harrisburg, Pa								3							
Nelson & LeMoon	Nelson & LeMoon	Chicago, Ill				1		2		3							
Netco	New England Truck Co	Fitchburg, Mass						2									
New York	Tegetmeier & Reipe	New York City					1½										
Niles	Niles Car & Mfg. Co	Niles, Ohio				1		2									
Old Hickory	Kentucky Wagon Mfg. Co	Louisville, Ky		½													
Old Reliable	Old Reliable Motor Truck Co	Chicago, Ill					1½	2	2½	3		4	5				7
Overland	Willys-Overland Co	Toledo, Ohio	⅜	⅝													

Heavy type represents vehicles whose specifications are given in this issue.

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and Electric Commercial Vehicles for 1917—Continued

Name	Manufacturer	Address	MODELS IN TONS CAPACITY (Figures refer to capacity, not number of models)													
			Under ½	½	¾	1	1½	2	2½	3	3½	4	5	5½	6	6½	7 and over
Packard	Packard Motor Car Co.	Detroit, Mich.				1	1½	2		3		4					
Packet	Packet Motor Truck Co.	St. Paul, Minn.	⅜														
Palmer	Palmer-Meyer Motor Car Co.	St. Louis, Mo.				1		2									
Palmer-Moore	Palmer-Moore Co.	Syracuse, N. Y.			¾	1											
Paulding	Anchor Auto Co.	St. Louis, Mo.			¾	1	1½	2									
Peerless	Peerless Motor Car Co.	Cleveland, Ohio						2		3		4	5				
Pennsy	Pennsy Motors Co.	Pittsburgh, Pa.		½													
Phoenix Centiped	Phoenix Mfg. Co.	Eau Claire, Wis.											5				
Pierce-Arrow	Pierce-Arrow Motor Car Co.	Buffalo, N. Y.						2					5				
Pullman	Pullman Motor Car Co.	York, Pa.		½													
Rainier	Rainier Motor Corp.	New York City		½													
Reo	Reo Motor Car Co.	Lansing, Mich.			¾			2									
Republic	Republic Motor Truck Co.	Alma, Mich.			¾	1	1½	2		3							
Riker	Locomobile Co.	Bridgeport, Conn.								3		4					
Robinson	Robinson Fire Apparatus Co.	St. Louis, Mo.															T
Robinson	Golden West Motors Co.	Sacramento, Cal.						2									
Rocco	Rocco Motor Co.	Hannibal, Mo.															
Rowe	Rowe Motor Truck Co.	Downington, Pa.				1		2		3			5				
Royal	Royal Motor Truck Co.	New York City				1		2			3½		5		6		7
Rush	Rush Motor Truck Co.	Philadelphia, Pa.		½													
Salvador	Mansur Motor Truck Co.	Haverhill, Mass.						2									
Sandow	Sandow Motor Truck Co.	Chicago, Ill.					1½	2		3							
Sanford	Sanford Motor Truck Co.	Syracuse, N. Y.				1	1½	2									
Saurer	International Motor Co.	New York City											5			6½	
Schleicher	Schleicher Motor Vehicle Co.	New York City								3			5				
Selden	Selden Motor Vehicle Co.	Rochester, N. Y.			¾	1		2			3½						
Service	Service Motor Truck Co.	Wabash, Ind.				1	1½	2			3½		5				
Signal	Signal Motor Truck Co.	Detroit, Mich.				1	1½	2			3½		5				
Sphinx	Sphinx Motor Car Co.	York, Pa.		½													
Standard	Standard Motor Truck Co.	Detroit, Mich.						2			3½	4	5				
States	States Motor Co.	Kalamazoo, Mich.		½													
Steele	W. M. Steele	Worcester, Mass.						2		3		4	5				
Stegeman	Stegeman Motor Car Co.	Milwaukee, Wis.					1½		2½		3½		5				
Sterling	Sterling Motor Truck Co.	Milwaukee, Wis.							2½		3½		5				7
Stewart	Stewart Motor Corp.	Buffalo, N. Y.		½	¾	1½											
Studebaker	Studebaker Corp.	Detroit, Mich.		½		1											
Sullivan	Sullivan Motor Car Co.	Rochester, N. Y.					1½	2									
Superior	E. G. Willingham's Sons	Atlanta, Ga.				1		2									
Thomas	Thomas Auto Truck Co.	New York City							2½								
Tiffin	Tiffin Wagon Co.	Tiffin, Ohio			¾	1	1½		2½				5		6		
Tower	Tower Motor Truck Co.	Greenville, Mich.						2									
Transit	Transit Motor Car Co.	Louisville, Ky.				1		2			3½		5				
Transport	Transport Tractor Co.	Long Island City, N. Y.											5				
Tulsa	Tulsa Auto & Mfg. Co.	Tulsa, Okla.															
Twin City	Brasie Motor Car Co.	Minneapolis, Minn.				1		2									
Union	Union Motor Truck Co.	Bay City, Mich.							2½								
United	United Motors Co.	Grand Rapids, Mich.						2			3½	4	5				
Universal	Universal Service Co.	Detroit, Mich.					1½	2		3							
U. S.	United States Motor Truck Co.	Covington, Ky.						2		3	3½		5				
Van	Van Motor Truck Co.	Newburgh, N. Y.															
Van Winkle	Van Winkle Motor Truck Co.	Atlanta, Ga.															
Velie	Velie Motor Vehicle Co.	Moline, Ill.						2			3½						
Vim	Vim Motor Truck Co.	Philadelphia, Pa.		½													
Voltz	Voltz Bros.	Chicago, Ill.								3			5				
Walter	Walter Motor Truck Co.	New York City									3½						7½
Watson	Watson Wagon Co.	Canastota, N. Y.											5				
Ware	Twin City Four Wheel Drive Co.	St. Paul, Minn.								3							
Washington	Washington Motor Car Co.	Hyattsville, Md.											5		6		7
White	White Co.	Cleveland, Ohio			¾		1½			3			5				
Wichita	Wichita Falls Motor Co.	Wichita Falls, Tex.				1	1½	2	2½		3½		5				
Wilcox	H. E. Wilcox Motor Co.	Minneapolis, Minn.			¾	1	1½	2			3½						
Wilson	J. C. Wilson Co.	Detroit, Mich.						2									
Wisconsin	Myers Machine Co.	Sheboygan, Wis.				1½			2½								
Witt-Will	Witt-Will Co.	Washington, D. C.				1		2									
W-S	Weier-Smith Truck Co.	Birmingham, Mich.							2½								
Zeitler & Lamson	Zeitler & Lamson Truck Co.	Chicago, Ill.					1½		2½		3½		5				

Steam Vehicles

Stanley	Stanley Motor Carriage Co.	Newton, Mass.			¾	1½										
Titan	American Machine Co.	Newark, Del.														

Electric Vehicles

Atlantic	Atlantic Vehicle Co.	Newark, N. J.				1		2			3½		5			
Couple-Gear	Couple-Gear Freight Wheel Co.	Grand Rapids, Mich.									3½		5			7
C. T.	Commercial Truck Co.	Philadelphia, Pa.		½		1		2			3½		5			
G. V.	General Vehicle Co.	Long Island City, N. Y.		½		1		2			3½		5			
Lansden	Lansden Co.	Brooklyn, N. Y.	¼	½		1		2			3½		5			T
Old Hickory	Kentucky Wagon Mfg. Co.	Louisville, Ky.				1										
Urban	Kentucky Wagon Mfg. Co.	Louisville, Ky.			¾		1½		2½			4				
Walker	Walker Vehicle Co.	Chicago, Ill.		½		1		2		3		4	5			
Ward	Ward Motor Vehicle Co.	Mount Vernon, N. Y.	¼	½		1		2			3½		5			

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Directory of Electric Industrial Trucks

Name	Manufacturer	Address	MODELS IN TONS CAPACITY *Figures refer to capacity, not number of models*														
			Under ½	½	¾	1	1½	2	2½	3	3½	4	5	5½	6	6½	7 and over
Electric Industrial Vehicles																	
Automatic	Automatic Transportation Co	Buffalo, N. Y.				1		2									
Buda	Buda Co	Chicago, Ill.						2									T
Cowan	Cowan Truck Co	Holyoke, Mass.						2									
Dynamic	Galion-Dynamic Motor Truck Co	Galion, Ohio						2									
Electromobile	Orenstein-Arthur Koppel Co	Koppel, Pa.															T
Elwell-Parker	Elwell-Parker Electric Co	Cleveland, Ohio															
G. V.	General Vehicle Co	Long Island City, N. Y.				1											
Hoagland-Thayer	Hoagland-Thayer, Inc.	Newark, N. J.						2									
Hunt	C. W. Hunt Co	West New Brighton, N. Y.						2									
Mercury	Mercury Mfg. Co	Chicago, Ill.															T

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Glossary of Terms Used in Specifications

How to Read THE COMMERCIAL VEHICLE'S Tables

MECHANICAL details of 386 gasoline truck chassis, produced by 137 manufacturers will be found on the twelve pages following this article. These tables contain separate items of information on each vehicle, except where THE COMMERCIAL VEHICLE has been unable to procure the information authoritatively from the officials of the manufacturing concern. Each make of vehicle is segregated into a separate group and each model has a line to itself.

Even thus condensed, it has been necessary to use a number of abbreviations. These are explained at the bottom of each table, in which the term abbreviated is given.

Not all users of motor trucks are familiar with the exact meaning of all the various technical terms used to describe different forms of construction. Below, in the order in which the terms will be encountered in the table will be found brief explanations of some of these terms:

Capacity in Pounds

The load capacity of a motor truck is the maximum amount of load it is intended to carry in regular service, in addition to the weight of the body, the cab and the crew.

Price of Chassis

The chassis price is the list price of the chassis, equipped with a standard seat or cab, and all other standard equipment except the body, which is usually either selected from a stock of standard bodies, or built to order, being charged for extra. Some makers, however, do not sell chassis not equipped with bodies, as indicated in the table by a small c following the price, representing that the price is for the *complete* vehicle.

Frame Construction

Truck frames are usually made of *pressed steel*, shaped to conform with the varying stresses at different portions of its anatomy, or of *rolled* steel, which is of uniform section and is merely cut off into lengths and assembled into the structure, being bent in some cases. Rolled steel for frames comes in *channel* and *I-beam* section. Frames are also made of *wood*, in some cases.

Frames differ, besides in their material, in their method of construction, some being *flexible*, others *rigid* and others half-way between, or *semi-flexible*. Flexible frames are so braced by cross-members that they are rigid in a horizontal plane, but may warp vertically in response to the thrust of the springs in negotiating uneven surfaces. Rigid frames are designed to maintain their shape despite such stress.

Kinds of Tires

Tires are made of rubber, steel and wood. Rubber tires are of four sorts, *solid*, *pneumatic*, sectional or *block*, and

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cushion. When the latter terms are used, that the tires are of rubber is understood.

Sizes of Tires

Two dimensions are usually given, the *diameter* and the width. The diameter is the total diameter from tread to tread. Many tires are oversize, however, and actually exceed their *rated* diameter. Width is often called tread, but in reality, it represents the width at the base. Some tires have greater tread width than others of *equal base width*, because of different cross-sectional contour. Rubber tires are made single and dual, a dual tire being two single ones on one rim. When a tire is specified as of a certain size, *dual*, this represents two tires of that size together on one rim.

Wheel Types

Wheels are made of *wood* and of *steel*, the latter being of the *cast* and *pressed* forms. Wood wheels are fitted with two types of spokes, *square* and *oval*, these terms referring to the shape of the cross-section of the spoke. Steel wheels are made in the form of a *disk* or *web*, without spokes, with oval spokes, with *cross-shaped* spokes and with *cruciform* spokes. The latter type has its spokes in branching pattern which permits the wheel to possess great strength while being exceedingly light. Some cast wheels are *hollow*, their spokes in this case being nearly always oval.

Bore and Stroke

The bore of an engine is the inside diameter of each of its cylinders. The stroke is the distance the piston travels from its extreme upper or lower point to the extreme lower or upper point. These dimensions are given in inches.

N. A. C. C. Horsepower

One horsepower is equal to 33,000 foot-pounds of energy, or sufficient power to lift 33,000 pounds 1 foot in 1 minute. It is figured theoretically in a four-cycle gasoline engine by the formula first adopted by the A. L. A. M., and now a N. A. C. C. standard, as follows: $\text{H.P.} = \frac{D^2 N}{2.5}$, in which D is the diameter of the cylinder in inches, or the bore, and N is the number of cylinders.

Valves Placed

Valves in a gasoline engine are for the purpose of admitting and releasing the active gas whose combustion within the cylinder furnishes the power. In a four-cycle engine as used on trucks, there are two types of valves, the *poppet* type and the *sleeve* type.

The poppet valve is shaped somewhat like a mushroom and fits down over a hole with a beveled or flat edge to correspond with that on the valve, being raised by a cam to effect an opening. They may be located *in the head, at the side*, or on *opposite* sides. They may also be located in two positions, as the intake at one side and the exhaust valve in the head.

There are three types of cylinder castings, the *L-head*, the *T-head* and the *I-head.* L-head cylinders have pockets at one side, in which the valves are located. T-head cylinders have these pockets at both sides, one for the exhaust and the other for the inlet, and I-head cylinders have their valves at the top of the cylinder, without pockets.

Sleeve-valve engines use hollow cylindrical sleeves, two in number, lining the cylinder and surrounding the piston. The cylinders have slots in them for the inlet and exhaust, corresponding slots in the sleeves serving to establish or cut off communication with the cylinder. There are two sleeves so that by having them move up and down at different times, their slots may be made to effect quick openings and closures of the ports. The sleeves are reciprocated by small cranks acted on by eccentrics. Engines with such valves are called *Knight* engines, after their inventor, Charles Y. Knight.

Two-cycle engines do not have valves, for an explosion takes place in each cylinder on each down stroke, as against once every other stroke in the four-cycle. In lieu of valves, ports are cut in the sides of the cylinders, similar to those on Knight engines, except that they are located near the bottom of the cylinder, thus being opened by the piston itself when it reaches the bottom of its stroke, and closed again when it starts upward.

Water Circulation

Two types of water pumps are in general use, the *centrifugal* type and the *gear* type. Centrifugal pumps consist of rotors with vanes or paddles on them, inclosed in a casing with an intake connection at the center and an outlet at the periphery. The rotor throws the water from the center to its periphery by centrifugal force. Gear pumps consist of meshing gears in close-fitting casings, with the intake and outlet connections on opposite sides of the point of meshing, the gear teeth acting as paddle-wheels. *Thermo-syphon* or natural circulation is induced by the rising of the water in the jackets due to heat, whence it overflows into the radiator through an outlet pipe, and runs back through the radiator to the lower connection to the jackets to be re-circulated.

Radiator Core Type

Radiators are to be divided into two general classifications, *cellular* and *tubular.* The true *cellular* radiator is built up of sheet metal so as to form intersecting vertical and horizontal water passages and rectangular or hexagonal air passages. Tubular radiators are of three kinds, flat- or square-*tube, round-tube* and *zig-zag-tube.* Square-tube radiators have rectangular tubes arranged to resemble a cellular or honeycomb type, but being in reality individual tubes, either vertical or horizontal. Round tubular radiators have either vertical or horizontal pipes, entirely independent of one another. They are of three types, one of which has the tubes sweated into cross-plates, which serve to radiate additional heat, another of which has individual fins attached to the tubes separately, and a third of which has *plain tubes*, without radiating perturbances. The former are called the *finned-tube* type and the latter the *tubular* type. Zig-zag tubular radiators consist of square tubes which are crimped to form diamond-shaped air passages to resemble the cellular type of radiator.

The *ring* type of radiator appeared in this country for the first time in 1916. This consists of a copper tubular radiator, the tubes being smooth and bare and arranged in a ring about a centrifugal fan. The construction as used in this country is similar to, but not identical, with the French Solex radiators.

Radiator Case Type

The case of a radiator incloses the core and serves as a tank at the top and bottom to distribute and collect again the water which goes through the core. Radiator cores are made of *sheet metal* and of *cast metal.* In the former case they are usually of sheet brass, soldered together. Cast cases are usually of aluminum or iron and made in several

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sections built up and sealed with gaskets. There are other types which are partially cast and partly of sheet metal, the tanks at top and bottom being of cast iron and the side plates of sheet metal.

Ignition Type

High-tension ignition systems are of the *single, dual, double,* and *dual-double* types, in general use. Single systems consist of a single set of plugs, supplied by the magneto only. Dual systems have a battery which may be used alternately with the magneto, in starting or running slowly. Double systems have two sets of plugs, one of which is supplied by the magneto and the other by a battery. Dual-double systems have two sets of plugs, either of which may be supplied by either the magneto or the battery. In some cases, two batteries are used in dual and double systems instead of the magneto.

Spark-advance

Spark-advance is employed to allow for the lag in ignition or the time it takes the charge to burn, so that at high speeds the spark may occur earlier in the engine cycle, so that by the time ignition has occurred the piston will not have more than just passed top center, permitting it to be retarded in low speeds and in starting to prevent back-kicks which would result from a too-early spark. The usual method is to have a lever on the steering wheel or column, for *hand* manipulation. Another method is to provide a governor on the magneto which *automatically* advances and retards the spark in accordance with the speed of the engine. A new development is a combination of these two by which the spark governor is given a limited range which may be advanced or retarded by a hand lever. In other systems, the advance is *fixed* at top center, or thereabouts, having no adjustment.

Electric System

The electric system has only recently come into any appreciable popularity on motor trucks.

Electric systems may be classified according to their functions. The simplest type is for *lighting only*, the second form combines *lighting and starting* and the most elaborate, *lighting, starting* and ignition. The combination systems may be further subdivided into the *one-unit* and *two-unit* types, the former comprising a *generator* or dynamo combined with a starting *motor* and in some cases with an ignition *distributer*, so that it is but one machine requiring but one driving connection. In some of these outfits, there is but one armature shaft for both generator and motor, in some cases two windings being used and in others the same windings with separate sets of brushes. Some of these have two armatures mounted in a single casing, driven at different speeds from a common connection with the engine or clutch shaft of the truck.

Two-unit systems have the generator and motor separate, those incorporating ignition either having a battery system distributor mounted separately or on the generator, or else a separate magneto incorporated with the generator.

Governor Type

Governors are of the *centrifugal, loose-ball, suction,* and *hydraulic* types. The centrifugal governor consists of revolving weights attached to toggle-levers so that as their speed of rotation increases, and they fly outward against a spring or the retarding influence of gravity, they impart movement to the toggle-levers which, acting upon a throttle in the intake pipe, cause the engine to be shut off at a certain critical speed. The loose-ball type is similar to this except that the weights are balls which are not mechanically connected to the rest of the mechanism, but float between two cones which take the place of the toggle-levers. The suction type is located in the intake manifold and is acted upon by the engine suction rather than by the speed of the engine. The hydraulic type is little more than a pressure gauge which is acted upon by the pressure of the water at high speeds.

Governor Drive

Three types of governor drive are employed, the first, *from the motor*, causing the governor to control the engine according to its own speed. The second type is driven *from the front wheel*, the *driveshaft*, or the *gearset* layshaft, and controls the motor in accordance with the speed of the truck. The third type is known as *duplex* drive, consisting of a combination of the above two methods, arranged with over-running clutches so that the fastest of two driving shafts controls the speed of the motor.

Fuel System

Gasoline is fed by *gravity*, by *vacuum*, or *pressure*. Vacuum feed is accomplished by utilizing the suction in the intake manifold to suck the fuel from the main tank to a smaller one mounted high on the engine or dash, beneath the hood. Pressure feed serves to raise the fuel from a low tank by air pressure maintained either by hand or by a power pump on the engine or both. Vacuum or pressure feed are used where the gasoline tank is not mounted sufficiently above the carbureter to insure feed at all angles.

Lubrication

There are two principal types of motor lubrication, splash, and non-splash. Simple, or *non-circulating splash*, consists of the introduction of oil into a splash-pit in the crankcase up to a certain maximum level, from which it is splashed by the connecting rods to the various inner parts of the motor. *Circulating-splash* is similar, except that an additional reservoir or sump is located below the crankcase, into which the oil overflow is strained, pumped out again and fed back into the splash pits, sometimes over the timing gears or bearings.

Splash-pressure is similar to circulating-splash, except that the oil is pumped out of the reservoir and onto the engine bearings and possibly through drillways in the crankshaft to the connecting rod and wrist-pin bearings under pressure.

Pressure oiling is the first of the non-splash methods, being similar to the splash-pressure system except that there is no splashing, but every wearing part is oiled either by direct pressure or by a fine mist of oil that is thrown out by the connecting rods as their bearings overflow.

Fuel-injection oiling is used only in two-cycle motors and consists of the admixture of lubricant with the fuel, so that the cylinders are oiled by the gas itself.

Clutch Type

Clutches are used to connect the engine, in motion, with the transmission mechanism, at rest, in order to start the truck in motion. It is necessary to start the engine, disconnected, before connecting it with the transmission line because internal-combustion motors will not start spontaneously, but must be set in motion externally, and because they do not generate sufficient power to take a load until they have attained speed. The most common type of clutch is the *cone* type. This consists of a relatively flat truncated cone, faced with leather or other friction material, and acting upon a

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conical face of the flywheel or female clutch member. A variation of this type consists of the *reversed cone* clutch, in which the male cone faces to the rear instead of forward.

Disk clutches are of two types, dry and wet. *Dry-disk* clutches consist of a series of disks or plates each alternate one of which is attached respectively to a shaft or inner drum or to the casing of the clutch. When tightly compressed, these disks adhere and cause the casing to drive the inner member or vice-versa. *Wet-disk*, or *disk-in-oil* clutches are similar except that the disks are of metal only, without facing, and run in a bath of oil. *Dry-plate* and *wet-plate* clutches are similar to the above except that they have only three friction elements instead of a number. *Contracting-band* and *expanding-shoe* clutches are explained by their names.

Gearset Type

Under gearsets, in the table, are grouped all manner of change-speed devices. Gearsets proper are of three types, sliding gear, individual clutch and planetary. Sliding gearsets consist of spur gears of different sizes, carried on parallel shafts, which when slid into mesh in various combinations result in transmission of the drive at various reductions. They are of two kinds, *selective* and *progressive*. The selective gearset may be changed from neutral to any speed without passing through intermediate speeds. In the progressive type, neutral is located either between first speed and reverse or between first and second. In reaching alternate speeds it is necessary to pass through intermediate speeds.

The *planetary* gearset consists of a series of small gear pinions surrounding a master gear, like the planets surround the sun, the planetary pinions meshing also with an encircling internally-toothed gear, or, at a different reduction, with another solar gear. A clutch may connect the two concentric solar gears for direct drive, while two band brakes, operating in connection with jaw clutches, may hold the frame which holds the planetary gears or the secondary solar gear, so that a reduced forward speed or reverse may be had.

The *individual-clutch* constant-mesh gearset consists of a lay-out similar to the selective sliding type, except that all of the gears are constantly in mesh, or connected by silent chains, the different speeds being obtained by the manipulation of jaw clutches on the selective plan.

Among other types of change-gears is the *friction*, which consists of a driving disk, or disks, and a driven wheel, or wheels, friction-tired, and disposed perpendicularly with the disk, upon a shaft, so that it may be slid back and forth across the disk, thus securing different speed ratios, or clear across beyond the center of the disk to secure reverse.

The *electric* drive consists of a generator or dynamo connected with the engine, and electric motors to drive the wheels. The electric motors generate their power at all speeds, thus taking the gearset's place.

Total Gear-Ratio

Total gear-ratio is the total reduction from the engine crankshaft to the road wheels. For example, if in high gear, the engine of a truck must revolve 9 times to one revolution of the road wheels, the gear-ratio is 9 to 1.

Final Drive

Final driving means are greatly diversified. *Single-chain* drive consists of a single chain from a live axle to the change-gear. *Double-chain* drive consists of two chains driving the wheels individually from a jackshaft, laid across the frame, parallel with the dead rear axle, the jackshaft being driven by bevel gears, usually, from a driving shaft leading to the gearset.

Bevel, or direct bevel drive, consists of a live axle which is driven by bevel gears direct from the driving shaft. *Double-reduction* drive consists of a similar drive to direct bevel except that a set of spur gears is introduced between the bevel gears and the differential. *Internal-gear* drive consists of a live jackshaft incorporated with a dead axle, and driving the wheels by spur pinions meshing with internal teeth on the brake-drums.

Worm drive is similar to direct bevel drive except that worm gears are substituted for bevel gears.

Driving Torque

Driving torque is the tendency of a live axle to twist under driving stress. It is taken by means of the *springs*, which for this purpose are anchored to the axle with extra rigidity and shackled to the frame at one point only; by a *torque-arm* attached to the axle and, at one point, to the frame; by converging *radius-rods*, attached at opposite ends of the axle and to the frame at one point; by a *torsion tube*, surrounding the driving shaft; or by the extended engine *sub-frame*, which is attached to the center of the axle and at two points to the frame.

Propulsion

Propulsion, or the pushing or pulling effort of the driving axle, is transmitted to the frame by *radius rods*, or distance rods, consisting of steel bars jointed to the axle and to the frame; by the *torsion tube*, or by the vehicle springs.

Brake Types

Brakes are of two types, *internal* and *external*, the former acting by expansion and the latter by contraction against the drum. There are numerous variations of these two types of brakes, but they may be classified as above. Brakes are sometimes faced with anti-burning friction fabric and others act metal-to-metal.

Brake Location

Brakes are applied to a variety of locations, the most common being on the *rear wheel* drums. On shaft-driven trucks they are sometimes located on the *driveshaft*, either at its front, next the gearset or at its rear end, next the axle. On chain-driven trucks brakes are located on the *jackshaft*, occupying positions similar to those on the rear wheels or else lying within the frame. Some trucks, notably front-driven and four-wheel-driven ones have their brakes on the *front wheels*, so arranged that the linkage will work whether the truck is headed straight or the wheels are turned.

Steering Location

Steering wheels are located either to the *right* or *left*, the right or left side of a truck always being understood to mean the corresponding sides of a man looking toward the front, from a position on the truck.

Control Levers Location

The control levers here referred to are the hand brake lever and the gearshift lever. These are usually located in the *center* of the cab, at the *right* of the cab or at the *left* of the cab; but in some constructions one lever will occupy a different position from its mate's. In these constructions the gearset lever is usually in the *center* and the brake lever either at the left or the right, in which cases the location is known as *center and right* or as *center and left*.

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Buyers' Guide to 1917 Gasoline Trucks

Classified According to Load Capacity and Combined with Salient Features of Chassis

TRUCKS UNDER ½-TON CAPACITY

Name and Model	Chassis Price	Wheelbase, Inches	Tires	N.A.C.C. Horsepower	Electric System	Gearset Type	Final Drive
Maxwell.....25	$535	103	pneu....	21.08	s&l.....	selec..	bevel
Overland.....75-B	625-c	104	pneu....	18.21	s,l&i....	selec..	bevel
Packet.....	350	100	pneu....	12.08	none....	frict...	dbl chn

TRUCKS OF ½-TON CAPACITY

Atlas.....17	$690	106	pneu....	16.92	.....	selec..	sp-bev
Briscoe.....4-24	625	104	pneu....	16.92	s,l&i....	selec..	bevel
Carliss.....A	800-c*	100	pneu....	15.64	.....	selec..	bevel
Croco.....17	825	108	p&s.....	16.92	.....	selec..	bevel
Crowther-Duryea.....	600-c	110	pneu....	22.50	s,l&i....	roller..	roller
D-E.....Junior	895	108	pneu....	15.64	s&l.....	selec..	top worm
Dispatch.....G	1,150	120	pneu....	22.50	s&l.....	fric...	dbl chn
Ellsworth.....25-A	695-c	108	pneu....	16.92	s,l&i....	selec..	bevel
Lawson.....35	.....	112	pneu....	22.50	s&l-2....	selec..	bevel
Lippard-Stewart.....MW	1,000	106	pneu....	16.92	s&l-2....	selec..	top worm
Old Hickory.....	825	112	pneu....	16.92	s&l-2....	selec..	bevel
Overland.....75-B	725	106	pneu....	27.20	s,l&i-2..	selec..	bevel
Pennsy.....15	660	98	pneu....	27.20	.....	selec..	bevel
Pullman.....4-24	.....	114	pneu....	22.50	s&l-2....	selec..	bevel
Rainier.....	850	115	pneu....	16.92	s&l.....	selec..	top worm
Rush.....D	695	105	pneu....	16.92	s&l-2....	selec..	bevel
Stewart.....5	695	106	pneu....	14.40	none....	selec..	int-gear
Studebaker.....SF	785	112	pneu....	24.22	s&l-2....	selec..	bevel
Vim.....20	635	102	pneu....	14.40	.....	selec..	bevel

TRUCKS OF ¾-TON CAPACITY

Brinton.....H	$950	115	pneu*...	16.92	lighting..	selec..	top worm
Collier.....M	800	118	pneu....	16.92	s,l&i....	selec..	bevel
Commerce.....N	975-c	120	pneu....	19.61	s,l&i....	selec..	bevel
Dart.....BB	1,200	124	solid....	19.61	none....	selec..	top worm
Derris.....I-B-4	1,900	132	pneu....	30.65	lighting..	prog..	sp-bev
Geneva.....1	.....	96	solid....	22.10	.....	plan..	dbl chn
G.M.C.....15	1,090	122	pneu....	19.61	none....	selec..	bevel
I.H.C.....H	1,225	115	solid....	19.61	s&l*....	selec..	int-gear
Jaffery.....1016	965	116	pneu....	22.50	s&l-2....	selec..	sp-bev
Kisselkar.....	950	124	pneu....	24.22	s&l-2*...	selec..	sp-bev
Kleiber.....AA	1,600	130*	solid*...	22.50	lighting..	selec..	top worm
Lane.....A	1,075	120	solid*...	16.92	.....	selec..	top worm
Lippard-Stewart.....W	1,600	125*	pneu	22.50	s&l.....	selec..	top worm
Little-Giant 15	1,500	138	p&s.....	19.61	lighting..	selec..	top worm
Menominee.....EW	1,295	124	cush....	22.50	none....	selec..	top worm
Palmer-Moore.....K	1,150	106	solid....	19.61	s&l*....	selec..	int-gear
Ree.....F	1,000	120	pneu....	27.20	s&l-2....	selec..	sp-bev
Republic.....9	750	120	cush....	16.92	lighting..	selec..	int-gear
Selden.....G	985	110	pneu....	15.64	s&l.....	selec..	top worm
Stewart.....3	1,290	118	pneu....	19.61	s&l-2....	selec..	int-gear

TRUCKS OF ¾-TON CAPACITY (Cont'd)

Tiffin.....A	$1,190	110	pneu*...	19.61	none....	selec..	int-gear
White.....GBBE	2,100	133½	pneu....	22.50	s&l.....	selec..	bevel..
Wilcox.....M	1,200	120	pneu....	19.61	lighting..	selec..	top worm

TRUCKS OF 1-TON CAPACITY

Acme.....B	$1,500	128	pneu*...	19.61	s,l&i....	selec..	top worm
Atterbury.....6B	1,775	140½	solid....	22.50	.....	selec..	top worm
Available.....1	1,700	132*	solid....	22.50	.....	selec..	top worm
Avery.....C	1,690	128	solid....	27.20	.....	selec..	dbl chn
Bessemer.....G	975	124	solid....	19.61	.....	selec..	int-gear
Brockway.....O	1,450	124*	solid*...	19.61	.....	selec..	top worm
Chase.....A	1,650	.....	solid....	19.61	.....	selec..	top worm
Commerce.....E	1,175	126	solid....	19.61	s&l-2....	selec..	int-gear
Continental (C).....FL	1,550	144	solid....	22.50	.....	selec..	top worm
D-E.....Senior	1,450	128*	solid....	19.61	.....	selec..	top worm
Denby.....R	990	119	pneu....	15.64	s&l.....	selec..	int-gear
Denmo.....10	1,385	124	p&s*....	22.50	s&l-2....	selec..	int-gear
Diamond-T.....J5	1,485	132	solid....	19.61	.....	selec..	top worm
Federal.....S	.....	132	solid*...	19.61	s,l&i*...	selec..	top worm
Ferschler.....	1,650	130	solid*...	19.61	none	selec..	top worm
Garford.....75	1,450	120	p&s.....	19.61	s&l.....	selec..	top worm
Globe.....	1,375	130*	solid....	25 39	.....	selec..	int-gear
G.M.C.....21	.....	136	solid....	22.50	none....	selec..	top worm
Gramm-Bernstein.....	1,650	124*	solid....	22.50	s&l-2*..	ind-c..	top worm
Hahn.....C	1,750	136*	solid....	27.20	.....	selec..	top worm
Hawkeye.....H	1,300	136*	solid....	22.50	.....	selec..	int-gear
I.H.C.....F	1,500	128*	solid....	19.61	s&l*....	selec..	int-gear
Independent.....F	1,385	128*	solid*...	19.61	s,l&i....	selec..	top worm
Kisselkar.....	1,250	132	solid*...	24.22	s&l-2*...	selec..	top worm
Koehler.....K	895	129	solid....	19.61	none....	selec..	int-gear
Lambert.....V2	1,700	144	solid....	29.00	s&.li....	fric...	dbl chn
Larrabee.....	1,550	130	solid*...	22.50	s,l&i....	selec..	top worm
Lincoln.....L	975	122*	pneu	19.61	s,l&i....	selec..	bevel
Lippard-Stewart.....H	2,000	145	solid....	22.50	s&l.....	selec..	top worm
Little Giant.....H	1,400	110	solid....	19.61	.....	.....	dbl chn
Mack.....AB	2,000	144*	solid....	25.60	s&l-2....	selec..	dbl chn
Mack.....AB	2,000	144*	solid....	25.60	s&l-2....	selec..	top worm
Menominee.....FW	1,575	130*	solid....	22.50	none....	selec..	top worm
Moreland.....15-D	1,650	126	solid....	22.50	lighting..	selec..	top worm
Nelson & LeMoon.....E1	1,700	opt.....	solid....	22.50	.....	selec..	top worm
Niles.....B	1,175	124	pneu....	19.61	opt.....	selec..	top worm
Packard.....1-D	2,200	126*	solid....	25.60	s&l-2....	prog..	top worm
Palmer.....	1,350	132½	solid....	22.50	none....	selec..	int-gear
Palmer-Moore.....M	1,350	126	solid....	22.50	s&l*....	selec..	int-gear
Republic.....10	.....	124	solid....	19.61	s&l-2....	selec..	int-gear
Royal.....	.....	124*	solid....	16.92	starting..	ind-c..	top worm
Sanford.....O	1,290	120	pneu*...	19.61	.....	selec..	int-gear
Selden.....TL	1,700	126½	solid....	19.61	s&l-2	selec..	top worm
Service.....120	1,375	135	solid*...	19.61	s&l-2*..	selec..	top worm
Signal.....F	1,550	144*	solid....	22.50	.....	selec..	top worm
Stewart.....4	1,390	128	solid....	19.61	.....	selec..	int-gear
Studebaker.....7	1,100	125	pneu	24.22	s&l-2....	selec..	bevel
Superior.....A	1,350	124*	solid....	19.61	none....	selec..	int-gear
Tiffin.....AW	1,450	112	solid....	19.61	.....	selec..	top worm
Wichita.....A	1,350	110*	solid....	16.92	s&l-2....	selec..	dbl chn
Wichita.....K	1,650	118*	solid	19.61	s&l-2....	selec..	top worm
Wilcox.....S	1,600	128	pneu*	22.50	lighting..	selec..	top worm
Witt Will.....WD16	2,000	120	solid*..	22.50	.....	selec..	top worm
Wisconsin.....B	1,650	136	solid....	19.61	.....	selec..	top worm

ABBREVIATIONS: General, *, *with other options;* opt, *optional.* **Tires, Kind,** pneu, *pneumatic;* cush, *cushion;* p&s, *pneumatic in front, solid in rear;* p&c, *pneumatic in front, cushion in rear;* c&s, *cushion in front, solid in rear.* **Electric System** s&l, *starting and lighting;* s, l & i, *starting; lighting and ignition;* l&i, *lighting and ignition;* s&i, *starting and ignition;* -2, *two unit.* **Gearset Type,** prog, *progressive sliding gear;* selec, *selective sliding gear;* plan, *planetary;* ind-c, *constant-mesh individual clutch;* fric, *friction;* elec, *electric.* **Final Drive,** bevel, *direct bevel;* sp-bev, *spiral bevel;* doub-red, *double-reduction, bevel and spur;* int-gear, *internal-gear;* ext-gear, *external gear;* top worm, *worm gear with worm on top;* dbl chn, *double chain;* sing chn, *single chain;* -f, *to front wheels;* -4, *to all four wheels.*

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TRUCKS OF 1½-TON CAPACITY

Name and Model	Chassis Price	Wheelbase, Inches	Tires	N.A.C.C. Horsepower	Electric System	Gearset Type	Final Drive
Atterbury 6R	$1,875	140½	solid	22.50		selec	top worm
Brockway J-2	1,825	124	solid	22.50		selec	top worm
Chase C	1,950	138	solid	19.61		selec	top worm
Continental (C) HL	1,750	144	solid	22.50		selec	top worm
Corbitt D	2,150	138	solid	22.50		selec	top worm
Dart E	1,800	130	solid	22.50		selec	top worm
Denby G	1,575	120*	solid	19.61	s&l-2	selec	int-gear
Diamond-T J4	2,050	154*	solid	22.50		selec	top worm
Federal J-M	1,800	144*	solid	27.20	s&l-2	selec	top worm
Garford 66	1,800	142*	solid	22.50	s&l	selec	top worm
G. A. Schacht	2,650	138*	solid	29.00		selec	top worm
G.M.C 31	1,900	144*	solid	22.50	none	selec	top worm
Gramm-Bernstein	2,000	130*	solid	22.50	s&l-2*	ind-c	top worm
Horner	2,250	145	solid	27.20		selec	top worm
Hurlburt	2,250	136*	solid	22.50	lighting	selec	top worm
Jeffery 2016	1,465	130	p&s	22.50	s&l-2	selec	int-gear
Kelly-Springfield K-31	2,000	144*	solid*	22.50	s&l-2	selec	dbl chn
Kelly-Springfield K-32	2,000	144*	solid*	22.50	s&l-2	selec	top worm
Kleiber A1	2,250	140*	solid	27.20	lighting	selec	top worm
Krebs 40	2,050	146	solid	22.50		selec	top worm
Lange C	1,850	130*	solid	22.50	none	ind-c	dbl chn
Larrabee	2,000	140*	solid	27.20	s,l&i-2	selec	top worm
Lippard-Stewart F	2,300	145*	solid	27.20	s&l	selec	top worm
Little Giant H	1,500	110	solid	19.61		selec	dbl chn
Maccar L	2,100	150	solid	27.20	none	selec	worm
Mack AB	2,350	162*	solid	25.60	s&l-2	selec	top worm
Mack AB	2,350	162*	solid	25.60	s&l-2	selec	dbl chn
Menominee H	1,775	130*	solid	22.50	none	selec	top worm
Moreland 15-B	1,950	126*	solid	27.20	lighting	selec	top worm
Moon B	1,600	140*	solid	22.50	none	selec	dbl chn
New York M	2,200	144*	solid	27.20		ind-c	top worm
Old Reliable	1,950	150*	solid	22.50	lighting	selec	top worm
Packard 1½-D	2,500	126*	solid	25.60	s&l-2	prog	top worm
Republic 11		144	solid	22.50	s&l-2	selec	int-gear
Sanford R	1,370	138	solid*	19.61		selec	dbl chn
Service 130	1,950	150	solid	27.20	s&l-2*	selec	top worm
Signal H	1,800	144*	solid	27.20		selec	top worm
Stegeman	1,900	150	solid	25.39	s&l-2	selec	top worm
Sullivan G	1,650	129	solid	22.50		selec	dbl chn
Tiffin GW	1,790	135	solid	22.50		selec	top worm
Universal G	1,950	133*	solid	22.50	lighting	selec	top worm
White TBC	3,000	145½	pneu	22.50	s&l	selec	db-red
Wichita L	1,800	118*	solid	19.61	s&l-2	selec	top worm
Wilcox R	1,800	134	solid	29.00	lighting	selec	top worm
Zeitler & Lamsen	1,850	150*	solid	25.60	l&i*	ind-c	top worm

TRUCKS OF 2-TON CAPACITY

Name and Model	Chassis Price	Wheelbase, Inches	Tires	N.A.C.C. Horsepower	Electric System	Gearset Type	Final Drive
Acason 2		150	solid	29.00		selec	top worm
Acme A	$2,100	148*	solid	27.20	lighting	selec	top worm
Armleder HW-2	2,800	166*	solid	27.20	lighting	selec	top worm
Atterbury 6C	2,375	153½	solid	27.20		selec	top worm
Autocar 21F	1,650	97*	solid*	18.10		prog	db-red
Available 2	2,250	156*	solid	27.20		selec	top worm
Avery B	2,700	128	solid	36.15		selec	dbl chn
Bessemer D	2,200*	146*	solid	27.20		selec	top worm
Blair C	2,850	121*	solid	29.00		ind-c	top worm
Brockway K-2	2,125	140*	solid	27.20		selec	top worm
Burford O-3	2,250	144*	solid	22.50	lighting	selec	int-gear
Columbia E	1,750	144*	solid	27.20	none	selec	int-gear
Continental (C) J	2,100	146	solid	27.20		selec	top worm
Corbitt C	2,400	148	solid	27.20		selec	top worm
Dayton H	2,650		solid	29.00		selec	dbl chn
DeKalb D-1½	2,100	134*	solid	27.20	none	selec	top worm
Denby H	1,790	144*	solid	22.50	s&l-2	selec	int-gear
Diamond-T J3	2,200	154*	solid	27.20		selec	top worm
Dorris I-B-W	1,990	132	pneu	30.65		selec	top worm
Federal O-P	2,100	144*	solid	27.20	s&l-2	selec	top worm
Forschler	2,250	140*	solid*	27.20	none	selec	top worm
Garford 70	2,300	142*	solid	29.00	s&l	selec	top worm
G. A. Schacht	2,800	144*	solid	29.00		selec	top worm
G.M.C 41	2,375	158*	solid	27.20	none	selec	top worm
Gramm-Bernstein	2,300	146*	solid	22.50	s&l-2*	ind-c	top worm

TRUCKS OF 2-TON CAPACITY (Cont'd)

Name and Model	Chassis Price	Wheelbase, Inches	Tires	N.A.C.C. Horsepower	Electric System	Gearset Type	Final Drive
Hahn E	$2,250	144*	solid	32.40		selec	top worm
Hall	2,000	132	solid	27.20	lighting	selec	top worm
Harvey W-F	2,250	150	solid	29.00	s&l-2	selec	top worm
Horner	2,650	145	solid	27.20		selec	top worm
Hurlburt	3,300	148	solid	27.20	lighting	selec	top worm
Independent G	1,850	144	solid	27.20		selec	top worm
Jeffery 4016	2,850	124*	solid	29.00	s&l-2	ind-c	int-g-4
Kisselkar	1,875	144*	solid	29.00		selec	top worm
Kleiber A2	2,400	145*	solid	27.20	lighting	selec	top worm
Krebs 60	2,375	162	solid	27.20		selec	top worm
Lange B	2,450	136*	solid	27.20	none	ind-c	dbl chn
Lippard-Stewart G	2,600	158*	solid	27.20	s&l	selec	top worm
Little Giant 16	2,500	144	solid	27.20		selec	top worm
Mack AB	2,700	162*	solid	25.60	s&l-2	selec	top worm
Mack AB	2,700	162*	solid	25.60	s&l-2	selec	dbl chn
Menominee D	2,240	144*	solid	27.20	none	selec	top worm
Nelson & LaMoon E2	2,250	opt	solid	27.20		selec	top worm
Netco D	2,350	144*	solid	27.20	s,l&i	selec	top worm
Netco E	2,600	144*	solid	33.75	s,l&i	prog	top worm
Niles E	1,875	140*	solid	27.20	opt	selec	top worm
Old Reliable	2,450	150	solid	25.60	lighting	selec	top worm
Packard 2-D	2,800	144*	solid	25.60	s&l-2	prog	top worm
Palmer	1,975	144	solid	27.20	none	selec	top worm
Peerless TC2		145	solid	32.40		selec	top worm
Pierce-Arrow	3,000	150*	solid	25.60		selec	top worm
Reo J	1,650	146	solid	27.20		selec	dbl chn
Republic 12		144*	solid	27.20	s&l-2	selec	int-gear
Sanford S	2,100	150*	solid	29.00		selec	int-gear
Selden TC	2,000	150	solid	22.50	s&l-2	selec	top worm
Selden JWD	2,250	150	solid	27.20	s&l	selec	top worm
Service 140	2,250	160*	solid	27.20	s&l-2*	selec	top worm
Signal J	2,100	150*	solid	27.20		selec	top worm
Standard 70	2,000	140	solid	27.20		selec	top worm
Steele C	2,250	115*	solid	27.20	lighting	ind-c	dbl chn
Sullivan E	2,250	150	solid	27.20		selec	top worm
Superior C	1,800	144	solid	22.50	none	selec	int-gear
United BSW	2,250	144*	solid	27.20	s&l	selec	top worm
U.S E	2,200	132*	solid	27.20		ind-c	dbl chn
U.S H	2,500	144*	solid	27.20		ind-c	top worm
Universal D	2,800	132*	solid	25.60	lighting	selec	dbl chn
Velie 25	2,250	150*	solid	27.20	starting	selec	top worm
Wichita B	2,100	118*	solid	19.61	s&l-2	selec	dbl chn
Wilcox Q	2,000	150*	solid	29.00	lighting	selec	top worm
Wilson E	2,350	144	solid	27.20		selec	top worm
Witt-Will WD16	2,500	144	solid	27.20		selec	top worm

TRUCKS OF 2½-TON CAPACITY

Name and Model	Chassis Price	Wheelbase, Inches	Tires	N.A.C.C. Horsepower	Electric System	Gearset Type	Final Drive
Brinton F	$2,250	138	solid	27.20	lighting	selec	top worm
Chase B	2,475	160	solid	27.20		selec	top worm
Corbitt B	2,650	148	solid	27.20		selec	top worm
Dart CC	2,470	150	solid	27.20	none	selec	top worm
DeKalb D-2½	2,450	136*	solid	27.00	none	selec	top worm
Denby K	2,090	144*	solid	22.50	s&l-2	selec	int-gear
Deane	3,000-c	150	solid	29.00		selec	dbl chn
Gersix C	2,500	150*	solid	33.75	s&l-2	ind-c	top worm
Gramm-Bernstein	2,700	156	solid	29.00	s&l-2*	ind-c	top worm
Kelly-Springfield K36	2,750	144*	solid*	22.50	s&l-2	selec	top worm
Kelly-Springfield K35	2,750	144*	solid*	22.50	s&l-2	selec	dbl chn
Kisselkar	2,250	166	solid	29.00	s&l-2*	selec	top worm
Kleiber B	2,750	150*	solid	27.20	lighting	selec	top worm
Lange B	2,450	136*	solid	27.20	none	ind-c	dbl chn
Larrabee	2,300	152*	solid	27.20	s&l-2	selec	top worm
Maccar H	2,600	162	solid	32.40	none	selec	top worm
Moreland 15-C	2,550	144*	solid	32.40	lighting	selec	top worm
Old Reliable	2,750		solid	29.00		selec	dbl chn
Royal		132*	solid	25.60	starting	ind-c	top worm
Stegeman	2,500	144*	solid	29.45	s&l-2	selec	top worm
Sterling	2,800	156*	solid	29.00	lighting	selec	top worm
Thomas 40	2,700	150*	solid	27.20	lighting	selec	top worm
Tiffin MC	2,360	140	solid	27.20		selec	dbl chn
Tiffin MW	2,500	140	solid	27.20		selec	top worm

ABBREVIATIONS: General, *, *with other options;* opt, *optional.* **Tires, Kind,** pneu, *pneumatic;* cush, *cushion;* p&s, *pneumatic in front, solid in rear;* p&c, *pneumatic in front, cushion in rear;* c&s, *cushion in front, solid in rear.* **Electric System,** s&l, *starting and lighting;* s, l & i, *starting, lighting and ignition;* l&i, *lighting and ignition;* s&i, *starting and ignition;* -2, *two unit.* **Gearset Type,** prog, *progressive sliding gear;* selec, *selective sliding gear;* plan, *planetary;* ind-c, *constant-mesh individual clutch;* fric, *friction;* elec, *electric.* **Final Drive,** bevel, *direct bevel;* sp-bev, *spiral bevel;* doub-red, *double-reduction, bevel and spur;* int-gear, *internal-gear;* ext-gear, *external gear;* top worm, *worm gear with worm on top;* dbl chn, *double chain;* sing chn, *single chain;* -f, *to front wheels;* -4, *to all four wheels.*

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TRUCKS OF 2½-TON CAPACITY (Cont'd)

Name and Model	Chassis Price	Wheel-base, Inches	Tires	N.A.C.C. Horse-power	Elec-tric System	Gear-set Type	Final Drive
Union.....B	$1,875	150	solid....	25.60	.....	selec..	int-gear
Wichita.....R	2,350	144	solid....	22.50	s&l-2....	selec..	top worm
Wisconsin.....C	2,500	156*	solid....	25.60	.....	selec..	top worm
W.S.....4	2,975	154	solid....	32.40	.....	.....	top worm-4
Zeitler & Lamsen.....	2,450	160*	solid....	25.60	l&i*.....	ind-c..	top worm

TRUCKS OF 3-TON CAPACITY

A & B.....3T	$4,500	144	solid....	42.76	.....	elec...	int-g-f
Avery.....A	2,500-c	140	wood....	36.15	.....	selec..	dbl chn
Avery.....B	3,200	128	solid....	36.15	.....	selec..	dbl chn
Beech Creek.....3A	3,850	132	solid....	29.00	.....	selec..	bevel-4
Blair.....D	3,250	121*	solid....	29.00	.....	ind-c..	top worm
Chase.....X	.....	160	solid....	27.20	.....	selec..	top worm
Duplex.....D	.....	130*	solid....	32.40	s,l&i....	selec..	int-gear-4
F.W.D.....B	4,000	124	solid....	36.15	s&l.....	ind-c..	bevel-4
G. A. Schacht.....	3,200	168*	solid....	29.00	.....	selec..	top worm
Herner.....	3,200	145	solid....	32.40	.....	selec..	top worm
Nelson & LeMoon.....E3	2,950	opt.....	solid....	32.40	.....	selec..	top worm
Old Reliable.....	3,250	150	solid....	29.00	lighting..	selec..	top worm
Peerless.....TC3	.....	151*	solid....	32.40	.....	selec..	dbl chn
Republic.....T	.....	165*	solid....	29.00	s&l-2....	selec..	int-gear
Riker.....	3,500	150*	solid....	29.00	s&l-2....	selec..	top worm
Schleicher.....	3,500	150*	solid....	29.00	none....	.....	dbl chn
Steele.....B	3,000	127*	solid....	40.00	lighting..	ind-c..	dbl chn
U.S.....D	2,700	144*	solid....	32.40	.....	ind-c..	dbl chn..
Universal.....A	3,400	132*	solid....	25.60	lighting..	selec..	dbl chn
White.....TAD	3,700	163	solid....	22.50	.....	selec..	dbl chn

TRUCKS OF 3½-TON CAPACITY

Acason.....	.....	168	solid....	29.00	.....	selec..	top worm
Acme.....C	.....	168*	solid....	32.40	lighting..	selec..	top worm
Armleder.....K-W	$3,500	156*	solid....	32.40	lighting..	selec..	top worm
Atterbury.....6D	3,175	167½	solid....	32.40	.....	selec..	top worm
Available.....3	3,300	168*	solid....	32.40	.....	selec..	top worm
Bessemer.....E	3,100	150*	solid....	32.40	.....	selec..	top worm
Brockway.....R	.....	164*	solid....	32.40	lighting..	selec..	top worm
Burford.....D-3	3,600	175*	solid....	32.40	lighting..	selec..	top worm
Couple Gear.....H-C	5,000	144*	solid....	53.00	light'g*.	elec....	bevel-4
Chase.....O	3,300	175	solid....	29.00	.....	selec..	top worm
Continental (C).....M	3,000	168*	solid....	32.40	.....	selec..	top worm
Corbitt.....A	3,200	168	solid....	32.40	.....	ind-c..	top worm
Dayton.....	3,400	.....	solid....	29.00	.....	selec..	worm
Dayton.....K	3,400	.....	solid....	36.15	.....	selec..	dbl chn
Diamond-T.....L	3,300	170*	solid....	32.40	.....	selec..	top worm
Federal.....L	2,800	146*	solid....	32.40	lighting..	selec..	top worm
Garford.....77-B	3,400	128*	solid..	29.00	s&l.....	selec..	top worm
G.M.C.....71	3,300	163*	solid....	32.40	none....	selec..	top worm
Gramm-Bernstein.....	3,400	158*	solid....	29.00	s&l-2*.	ind-c..	top worm
Hall.....	2,800	144	solid....	32.40	lighting..	selec..	top worm*
Harrison.....C	.....	.....	solid....	32.40	.....	selec	dbl chn
Harrison.....F	.....	.....	solid....	32.40	.....	selec	dbl chn
Harvey.....W-H	2,950	160*	solid....	29.00	s&l-2....	selec	top worm
Hurlburt.....	3,500	146*	solid....	29.00	lighting..	selec..	top worm
Kelly-Springfield.....K-40	3,400	150*	solid*...	32.40	s&l-2....	selec	dbl chn
King.....	2,600	120	solid....	32.40	.....	ind-c..	dbl chn
Kleiber.....C	3,500	160*	solid....	32.40	lighting..	selec	top worm
Knickerbocker.....A	3,500	128	solid....	32.40	lighting..	selec	dbl chn
Krebs.....90	3,250	180	solid....	32.40	.....	selec	top worm
Maccar.....M	3,250	174	solid....	32.40	none....	selec	top worm
Mack.....AC	3,400	156*	solid....	40.00	s&l-2....	selec	dbl chn
Menominee.....G	2,775	160*	solid....	32.40	none....	.....	top worm
Packard.....3-D	3,400	156*	solid....	32.40	s&l-2....	prog..	top worm
Royal.....	.....	158*	solid....	29.00	starting..	ind-c..	top worm

TRUCKS OF 3½-TON CAPACITY (Cont'd)

Name and Model	Chassis Price	Wheel-base, Inches	Tires	N.A.C.C. Horse-power	Elec-tric System	Gear-set Type	Final Drive
Selden.....N	$2,950	164	solid....	32.40	s&l-2....	selec..	top worm
Service.....170	3,000	170*	solid....	29.00	s&l-2*...	selec..	top worm
Service.....175	3,250	170*	solid....	32.40	s&l-2*...	selec..	top worm
Signal.....M	3,000	168	solid....	32.40	.....	selec..	top worm
Standard.....60	2,850	144*	solid....	32.40	.....	selec..	top worm
Stegeman.....	3,000	156	solid....	33.75	s&l-2....	selec..	top worm
Sterling.....	3,400	158*	solid....	29.00	lighting..	selec..	top worm
United.....CSW	2,900	144*	solid....	32.40	s&l.....	selec..	top worm
U.S.....J	3,150	156*	solid....	32.40	.....	ind-c..	top worm
Velie.....26	3,350	172*	solid....	32.40	none....	selec..	top worm
Walter.....C	4,200	132*	solid....	30.65	.....	selec..	ext-g-4
Wichita.....O	3,250	165*	solid....	32.40	s&l-2....	selec..	top worm
Wilcox.....P	2,900	154*	solid....	29.00	lighting..	selec..	top worm
Zeitler & Lamsen.....	3,150	170*	solid....	36.15	l&i.....	ind-c..	top worm

TRUCKS OF 4-TON CAPACITY

Blair.....E	$3,750	144*	solid....	32.40	.....	ind-c..	top worm
Kelly-Springfield.....K-45	3,600	150*	solid*...	32.40	s&l-2....	selec.	dbl chn
Kisselkar.....	2,850	168*	solid....	29.00	s&l-2*..	selec.	top worm
Mereland.....15-G	3,400	162*	solid....	36.15	lighting..	selec..	top worm
Old Reliable.....	3,750	.....	solid....	36.15	lighting..	selec..	top worm
Old Reliable.....	3,750	.....	solid....	36.15	lighting..	selec..	dbl chn
Packard.....4-D	3,800	156*	solid....	32.40	s&l-2....	prog..	top worm
Peerless.....TC4	.....	151*	solid....	32.40	.....	selec.	dbl chn
Riker.....	3,650	150*	solid....	29.00	s&l-2....	selec..	top worm
Standard.....40	3,025	144*	solid....	32.40	.....	selec..	dbl chn
Steele.....BA	3,500	127*	solid....	40.00	lighting..	ind-c..	dbl chn
United.....DSW	3,300	144*	solid....	36.15	s&l.....	selec.	top worm

TRUCKS OF 5-TON CAPACITY

A & B.....5T	$4,750	144	solid....	42.76	.....	elec...	int-g-f....
Available.....5	4,400	168*	solid....	32.40	.....	selec..	top worm
Avery.....B	4,500	128	solid....	44.20	.....	selec.	dbl chn
Bessemer.....H	3,600	150	solid....	32.40	.....	selec..	top worm
Blair.....F	4,250	144*	solid....	32.40	.....	ind-c..	top worm
Couple Gear.....AC	5,350	144*	solid....	53.00	lighti'g*.	elec...	bevel-4
Dayton.....M	4,500	.....	solid....	44.20	.....	selec.	dbl chn
Diamond-T.....R	4,200	170*	solid....	32.40	.....	selec.	top worm
Federal.....W	.....	156*	solid....	29.00	s,l&i*...	selec.	top worm
Garford.....68	4,300	128*	solid....	36.15	none....	selec.	dbl chn
G.V. Mercedes.....FV	.....	192½	solid....	29.00	.....	selec.	int-gear
G.M.C.....101	3,850	163*	solid....	32.40	none....	selec.	top worm
Gramm-Bernstein.....	4,300	168*	solid....	32.40	s&l-2*..	ind-c.	top worm
Hall.....	3,400	144	solid....	32.40	lighting..	selec.	dbl chn
Harvey.....W-K	3,600	160*	solid....	32.40	s&l-2....	selec.	top worm
Herner.....	4,200	156	solid....	44.20	.....	selec.	top worm
Hurlburt.....	4,250	156*	solid....	33.75	lighting..	selec.	top worm
Kelly-Springfield.....K-50	4,250	150*	solid*...	32.40	s&l-2....	selec.	dbl chn
Kisselkar.....	3,350	180	solid....	29.00	s&l-2*..	selec.	top worm
Kleiber.....D	4,500	170*	solid....	44.20	lighting..	selec.	top worm
Knickerbocker.....C	4,500	148*	solid....	32.40	lighting..	selec.	dbl chn
Mereland.....16-J	3,800	180*	solid....	36.15	lighting..	selec.	worm
Old Reliable.....	4,500	150*	solid....	36.15	lighting..	selec.	dbl chn
Peerless.....TC5	.....	151*	solid....	32.40	.....	selec.	dbl chn
Pierce-Arrow.....	4,500	168*	solid....	38.25	.....	selec.	top worm
Royal.....	.....	168*	solid....	36.15	starting..	ind-c..	top worm
Saurer.....L	4,800	153½	solid....	34.28	none....	selec.	dbl chn
Schleicher.....	4,500	150*	solid....	40.00	none....	selec.	dbl chn
Service.....200	4,000	170*	solid....	32.40	s&l-2*..	selec.	top worm
Signal.....R	4,000	180	solid....	32.40	.....	selec.	top worm
Standard.....50	3,400	144*	solid....	29.00	.....	selec.	topworm
Steele.....A	4,000	127*	solid....	40.00	lighting..	ind-c.	dbl chn
Stegeman.....	4,000	170	solid....	33.75	s&l-2....	selec.	top worm
Sterling.....	4,500	168	solid....	36.15	lighting..	selec.	top worm

ABBREVIATIONS: General, *, *with other options;* opt. *optional.* **Tires, Kind,** pneu, *pneumatic;* cush, *cushion;* p&s, *pneumatic in front, solid in rear;* p&c, *pneumatic in front, cushion in rear;* c&s, *cushion in front, solid in rear.* **Electric System,** s&l, *starting and lighting;* s, l & i, *starting, lighting and ignition;* l&i, *lighting and ignition;* s&i, *starting and ignition;* -2, *two unit.* **Gearset Type,** prog, *progressive sliding gear;* selec, *selective sliding gear;* plan, *planetary;* ind-c, *constant-mesh individual clutch;* fric, *friction;* elec, *electric.* **Final Drive,** bevel, *direct bevel;* sp-bev, *spiral bevel;* doub-red, *double-reduction, bevel and spur;* int-gear, *internal-gear;* ext-gear, *external gear;* top worm, *worm gear with worm on top;* dbl chn, *double chain;* sing chn, *single chain;* -f, *to front wheels;* -4, *to all four wheels.*

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TRUCKS OF 5-TON CAPACITY (Cont'd)

Name and Model	Chassis Price	Wheel-base, Inches	Tires	N.A.C.C. Horse-power	Elec-tric System	Gear-set Type	Final Drive
Tiffin.....RW	$4,250	168	solid....	33.75	s&l-2....	selec..	top worm
United.....ESW	3,900	144*	solid....	41.62	s&l-2*...	selec..	top worm
U.S.....K	4,000	168*	solid....	36.15	.....	ind-c..	top worm
White.....TCD	4,500	169	solid....	29.00	.....	selec..	dbl chn
Wichita.....Q	3,850	165*	solid....	32.40	s&l-2....	selec..	top worm
Zeidler & Lamson.....	4,150	180*	solid....	41.62	l&i*.....	ind-c..	top worm

TRUCKS OF 5½-TON CAPACITY

Name and Model	Chassis Price	Wheel-base, Inches	Tires	N.A.C.C. Horse-power	Elec-tric System	Gear-set Type	Final Drive
Maccar.....U	.....	186	solid....	32.40	.....	selec..	top worm
Mack.....AC	$4,000	156*	solid....	40.00	s&l-2....	selec..	dbl chn

TRUCKS OF 6-TON CAPACITY

Name and Model	Chassis Price	Wheel-base, Inches	Tires	N.A.C.C. Horse-power	Elec-tric System	Gear-set Type	Final Drive
Deane.....	$4,500-c	178	solid....	36.15	.....	selec..	dbl chn
Garford.....69	4,500	128*	solid....	41.61	none....	selec..	dbl chn
Gramm-Bernstein.....	4,500	168*	solid....	32.40	s&l-2*...	ind-c..	top worm
G.V.-Mercedes.....S.V.	.....	192½	solid....	29.00	.....	selec..	int-gear
Kelly-Springfield....K-60	4,500	150*	solid*...	32.40	s&l-2....	selec..	dbl chn
Peerless.....TC6	.....	151*	solid....	32.40	.....	selec..	dbl chn
Royal.....	.....	158	solid....	42.20*	.....	ind-c..	top worm*
Tiffin.....SW	4,550	168	solid....	33.75	s&l-2....	selec..	top worm

TRUCKS OF 6½-TON CAPACITY

Name and Model	Chassis Price	Wheel-base, Inches	Tires	N.A.C.C. Horse-power	Elec-tric System	Gear-set Type	Final Drive
Saurer.....M	$5,800	156½	solid....	34.28	none....	selec..	dbl chn

TRUCKS OF 7-TON CAPACITY AND OVER

Name and Model	Chassis Price	Wheel-base, Inches	Tires	N.A.C.C. Horse-power	Elec-tric System	Gear-set Type	Final Drive
Dayton.....E	$4,950	.....	solid....	44.20	.....	selec..	dbl chn
Hurlburt.....	5,000	156*	solid....	33.75	lighting..	selec..	top worm
Mack.....AC	4,500	156*	solid....	40.00	s&l-2....	selec..	dbl chn
Old Reliable.....	5,000	150	solid....	41.62	lighting..	selec..	dbl chn
Royal.....	.....	158*	solid....	44.20	.....	ind-c..	dbl chn
Sterling.....	4,750	168	solid....	36.15	lighting..	selec..	dbl chn
Walter.....B	4,750	162*	solid....	30.65	.....	selec..	ext-g-4

TRACTORS

Name and Model	Chassis Price	Wheel-base, Inches	Tires	N.A.C.C. Horse-power	Elec-tric System	Gear-set Type	Final Drive
Knox.....35	$4,500	108½	solid....	40.00	s&l-2....	selec..	dbl chn
Knox.....36	5,000	108½	solid....	40.00	s&l-2....	selec..	dbl chn
Mack.....AC	3,400	119	solid....	40.00	s&l-2....	selec..	dbl chn
Mack.....AC	4,000	119	solid....	40.00	s&l-2....	selec..	dbl chn
Mack.....AC	4,500	119	solid....	40.00	s&l-2....	selec..	dbl chn
Mercury-Bulley.....A	3,400	71	solid....	29.00	lighting..	ind-c..	dbl chn
Transport.....T	2,500	80	solid....	19.61	.....	selec..	top worm
Watson.....	3,600	80	solid....	32.40	.....	selec..	top worm

**ABBREVIATIONS: General, *, *with other options;* opt, *optional.* Tires, Kind, pneu, *pneumatic;* cush, *cushion;* p&s, *pneumatic in front, solid in rear;* p&c, *pneumatic in front, cushion in rear;* c&s, *cushion in front, solid in rear.* Electric System, s&l, *starting and lighting;* s, l & i, *starting lighting and ignition;* l&i, *lighting and ignition;* s&i, *starting and ignition;* -2, *two unit.* Gearset Type, prog, *progressive sliding gear;* selec, *selective sliding gear;* plan, *planetary;* ind-c, *constant-mesh individual clutch;* fric, *friction;* elec, *electric.* Final Drive bevel, *direct bevel;* sp-bev, *spiral bevel;* doub-red, *double-reduction, bevel and spur;* int-gear, *internal-gear;* ext-gear, *external gear;* top worm, *worm gear with worm on top;* dbl chn, *double chain;* sing chn, *single chain;* -f, *to front wheels;* 4, *to all four wheels.*

How to Get the Most Out of These Tables

ONE cursory reading of these tables can do little more than to give one a general conception of what variety of chassis designs is offered by American truck builders; to get the most out of them it is necessary to study them intelligently. Even then, their utility will only have been partially realized, since perhaps their greatest value lies in their use as a reference during the year, or in years to come.

A proper understanding of the portent of the present specifications of trucks is greatly facilitated by a thoughtful perusal of the article on the trends of the times in motor truck engineering which appears at the front of this issue. Here the dry facts and figures in the tables are made to take on real life through careful interpretation by experts and by virtue of painstaking comparison with engineering practice in other years the significance of present tendencies is made plain.

The prospective buyer should find these tables a dependable means of ascertaining what vehicles are available, their capacities, prices, types and design. The present owner may keep himself posted on developments since he last purchased, so that when he again goes forth to purchase more trucks, he will be able to buy discerningly.

The dealer may keep abreast of the times in truck construction. He will be able to talk truck construction intelligently through an intimate knowledge of the most favored practice as well as individual features possessed exclusively by certain makes. It gives him detailed information as to what the market has to offer in competition with what he is himself selling and prepares him to choose discriminately should it become necessary for him to change his line. All this in a form adapted to convenient and quick reference.

To the manufacturer, engineer, sales executive and purveyor of materials and parts to the industry, the tables present a means of comparison between different makes and models, a survey of different models offered and a compendium of current engineering trends not duplicated elsewhere, each item of information being furnished on all of the different makes of vehicle to an almost complete degree.

The tremendous amount of labor, time and expense involved in the preparation of these tables can hardly be appreciated by the uninitiated, but it is so great as to preclude for the present, at least, more frequent publication than annually. Major changes in specifications, the advent of new models and the discontinuance of old ones are faithfully chronicled in the pages of THE COMMERCIAL VEHICLE throughout the year, so that one may easily keep his reference up to date until a new set is published.

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Technical Specifications of Gaso

Details of 386 Gasoline and Gasoline-Electric Motor Truck Chassis Engine, Transmission, Control and Equipment

Name and Model	Capacity in Pounds	Price of Chassis	Wheelbase in Inches	FRAME		TIRES			Wheels	MOTOR							IGNITION		
				Material	Construction	Kind	SIZES IN INCHES Front	SIZES IN INCHES Rear		No. of Crankshaft Bearings	Bore and Stroke	N.A.C.C. Hp.	Cylinders Cast	Valves Placed	COOLING Water Circulation	COOLING Radiator Core and Case	Type	Make	Spark Advance
A & B.....3 T	6,000	$4,500	144	rolled-c..	semi-flx .	solid....	48x3½d	48x3½d	wood-ov.	3	4-5½x4½	42.76	pairs....	right...	gear...	fin-sheet..	dual..	Bosch....	hand....
A & B.....5 T	10,000	4,750	144	rolled-c..	semi-flx..	solid....	48x3½d	48x5d	wood-ov.	3	4-5½x4½	42.76	pairs....	right...	gear...	fin-sheet...	dual..	Bosch....	hand....
Acason.....2	4,000	.....	150	pr-steel..	semi-flx..	solid....	34x4	36x3½d	wood-ov	3	4-4½x5½	29.00	pairs....	left....	cent...	fin-cast....	sing..	Eisemann..	hand....
Acason.....	7,000	.....	168	pr-steel..	semi-flx..	solid....	36x5	38x5d	wood-ov.	3	4-4½x5½	29.00	pairs....	left....	cent...	fin-cast....	sing...	Eisemann..	hand....
Acme.....B	2,000	1,500	128	pr-steel..	semi-flx..	pneu....	34x3	34x4	wood-sq.	3	4-3½x5	19.61	block...	left....	thermo.	fin-sheet...	sing...	Eisemann..	hand....
Acme.....A	4,000	2,100	148*	pr-steel..	semi-flx..	solid....	36x4	36x6	wood-sq.	3	4-4½x5½	27.20	block...	left....	cent...	fin-sheet...	sing...	Eisemann..	fixed....
Acme.....C	7,000	.....	168*	rolled-c..	semi-flx..	solid....	36x5	40x5d	wood-sq.	3	4-4½x5½	32.40	pairs....	left....	cent...	fin-cast....	sing...	Eisemann..	fixed....
Armleder.....HW2	4,000	2,800	166*	pr-steel..	semi-flx..	solid....	36x4	36x7*	wood-sq.	3	4-4½x5½	27.20	block...	left....	cent...	cell-sheet..	sing...	Bosch....	hand....
Armleder.....KW	7,000	3,500	156*	rolled-I..	semi-flx..	solid....	36x5	36x5d	wood-sq.	3	4-4½x5½	32.40	pairs....	left....	cent...	fin-cast....	sing...	Bosch....	hand....
Atlas.....17	1,000	690	106	pr-steel..	.....	pneu....	30x3½	30x3½	wood-ov.	2	4-3½x5	16.92	block...	right...	thermo.	fin-sheet...	sing...	Dixie....	hand....
Atterbury.....6B	2,000	1,775	140½	pr-steel..	flexible..	solid....	36x3½	36x5	wood-sq.	3	4-3½x5½	22.50	block...	left....	cent...	fin-cast....	sing...	Bosch....	fixed....
Atterbury.....6R	3,000	1,875	140½	pr-steel..	flexible..	solid....	36x3½	36x5	wood-sq.	3	4-3½x5½	22.50	block...	left....	cent...	fin-cast....	sing...	Bosch....	fixed....
Atterbury.....6C	4,000	2,375	153½	pr-steel..	flexible..	solid....	36x4	36x4d	wood-sq.	3	4-4½x5½	27.20	block...	left....	cent...	fin-cast....	sing...	Bosch....	fixed....
Atterbury.....6D	7,000	3,175	167½	pr-steel..	flexible..	solid....	36x5	40x5d	wood-sq.	3	4-4½x5½	32.40	pairs....	left....	cent...	fin-cast....	dual..	Bosch....	hand....
Autocar.....21F	4,000	1,650	97	rolled-c.	.....	solid*...	34x4*	34x5*	wood-ov.	2	2-4¼x4½	18.10	sing.....	top....	cent...	cell-sheet..	sing...	Bosch....	fixed....
Available.....1	2,000	1,700	132*	rolled-c..	semi-flx..	solid....	36x3½	36x4	wood-ov.	3	4-3½x5	22.50	block...	right...	thermo.	cell-sheet..	sing...	Bosch....	fixed....
Available.....2	4,000	2,250	156*	rolled-c..	semi-flx..	solid....	36x4	36x7	wood-ov.	3	4-4½x5½	27.20	block...	left....	cent...	cell-sheet..	sing...	Bosch....	fixed....
Available.....3	7,000	3,300	168*	rolled-c..	semi-flx..	solid....	36x5	40x5d	wood-ov.	3	4-4½x5½	32.40	pairs....	left....	cent...	cell-sheet..	sing...	Bosch....	fixed....
Available.....5	10,000	4,400	168*	rolled-c..	semi-flx..	solid....	36x6	40x6d	wood-ov.	3	4-4½x5½	32.40	pairs....	right....	cent...	cell-sheet..	sing...	Bosch....	fixed....
Avery.....C	2,000	1,690	128	.....	.....	solid....	34x3½	34x5	.....	.....	4-4½x5½	27.20	block...	left....	cent...	fin-sheet...	dual..	Heinze....	hand....
Avery.....B	4,000	2,700	128	.....	.....	solid....	36x4	36x3½d	.....	.....	4-4½x5	36.15	sing.....	left....	cent...	fin-sheet...	dual..	Eisemann..	auto....
Avery.....B	6,000	3,200	128	.....	.....	solid....	38x5	38x4d	.....	.....	4-4½x5	36.15	sing.....	left....	cent...	cell-sheet..	dual..	Eisemann..	auto....
Avery.....A	6,000	2,500-c	140	.....	.....	wood....	38x5	38x4d	.....	.....	4-4½x5	36.15	sing.....	left....	cent...	fin-sheet...	dual..	Eisemann..	auto....
Avery.....B	10,000	4,500	128	.....	.....	solid....	38x6	38x5d	.....	.....	4-5½x5½	44.20	pairs....	opp....	cent...	cell-sheet..	dual..	Eisemann..	auto....
Beech Creek.....3A	6,000	3,850	132	rolled-c..	flexible..	solid....	36x6	36x6	wood-sq.	3	4-4½x5½	29.00	pairs....	left....	cent...	cell-sheet..	sing...	Eisemann.	hand....
Bessemer.....G	2,000	975	124	pr-steel..	semi-flx..	solid....	35x3	35x3½	wood-sq	3	4-3½x5	19.61	block...	right...	thermo.	cell-sheet..	sing..	Bosch....	hand....
Bessemer.....D	4,000	2,200*	146*	pr-steel..	semi-flx..	solid....	37x4	37x4d	wood-sq	3	4-4½x5½	27.20	block...	left....	cent...	cell-cast...	sing...	Bosch....	hand....
Bessemer.....E	7,000	3,100	150*	pr-steel..	semi-flx..	solid....	37x5	37x5d	wood-sq.	3	4-4½x5½	32.40	pairs....	left....	cent...	cell-cast...	sing...	Bosch....	hand....
Bessemer.....H	10,000	3,600	150	pr-steel..	semi-flx..	solid....	37x6	37x6d	wood-sq.	3	4-4½x5½	32.40	pairs....	left....	cent...	cell-cast...	sing...	Bosch....	hand....
Blair.....C	4,000	2,850	121*	pr-steel..	flexible..	solid....	34x4	34x3½d	wood-sq.	3	4-4½x5½	29.00	pairs....	left....	cent...	z-z-t-sheet.	dual..	Bosch....	fixed....
Blair.....D	6,000	3,250	121*	pr-steel..	flexible..	solid....	36x4	36x4d	wood-sq.	3	4-4½x5½	29.00	pairs....	left....	cent...	z-z-t-sheet.	dual..	Bosch....	fixed....
Blair.....E	8,000	3,750	144*	pr-steel..	flexible..	solid....	36x5	36x5d	wood-sq.	3	4-4½x6½	32.40	pairs....	left....	cent...	z-z-t-sheet.	dual..	Bosch....	auto....
Blair.....F	10,000	4,250	144*	pr-steel..	flexible..	solid....	36x6	36x6d	wood-sq.	3	4-4½x6½	32.40	pairs....	left....	cent...	z-z-t-sheet.	dual..	Bosch....	auto....
Brinton.....H	1,500	950	115	.....	semi-flx..	pneu*...	33x4	33x4*	wood-ov.	2	4-3½x5	16.92	block...	left....	gear...	cell-sheet..	sing...	.....	fixed....
Brinton.....F	5,000	2,250	138	.....	semi-flx..	solid....	36x4	36x6	wood-ov.	3	4-4½x5	27.20	block...	left....	gear...	cell-sheet..	sing...	.....	fixed....
Briscoe.....4-24	1,000	625	104	pr-steel..	rigid....	pneu....	30x3½	30x3½	wood-ov.	2	4-3½x5½	16.92	block...	right...	thermo.	z-z-t-sheet.	sing...	Splitdorf...	hand....
Brockway.....O	2,000	1,450	124*	pr-steel..	flexible..	solid....	34x3½	34x4	wood-sq.	3	4-3½x5	19.61	block...	right...	thermo.	fin-cast....	sing...	Bosch....	fixed....
Brockway.....J-2	3,000	1,825	124*	pr-steel..	flexible..	solid....	36x3½	36x5	wood-sq.	3	4-3½x5	22.50	block...	right...	thermo.	fin-cast....	sing...	Bosch....	fixed....
Brockway.....K-2	4,000	2,125	140*	pr-steel..	flexible..	solid....	36x4	36x6*	wood-sq.	3	4-4½x5½	27.20	block...	left....	cent...	fin-cast....	sing...	Bosch....	fixed....
Brockway.....R	7,000	.....	164*	pr-steel..	semi-flx..	solid....	36x5	36x5d	wood-sq.	3	4-4½x5½	32.40	pairs....	left....	cent...	fin-cast....	sing...	Bosch....	hand....
Burford.....O-3	4,000	2,250	144*	pr-steel..	rigid....	solid....	36x3½	36x3½d	wood-sq	3	4-3½x5½	22.50	block...	right...	cent...	fin-cast....	sing...	Eisemann.	fixed....
Burford.....D-3	7,000	3,600	175*	pr-steel..	rigid....	solid....	38x5	38x5d	wood-sq	3	4-4½x6½	32.40	block...	left....	cent...	fin-cast....	sing...	Eisemann.	fixed....
Couple Gear.....HC	7,000	5,000	144*	rolled-c..	semi-flx..	solid....	36x4d	36x4d	pr-steel-d	5	4-5½x6	53.00	sing.....	opp....	gear...	cell-sheet..	dual..	Eisemann.	2-pt.-fix.
Couple Gear.....AC	10,000	5,350	144*	rolled-c..	semi-flx..	solid....	36x5d	36x5d	pr-steel-d	5	4-5½x6	53.00	sing.....	opp....	gear...	cell-sheet..	dual..	Eisemann.	2-pt.-fix.
Chase.....A	2,000	1,650	.....	pr-steel..	.....	solid....	36x3½	36x5	wood-ov.	3	4-3½x5½	19 61	block		cent...	fin-sheet...	sing...	Bosch....	fixed....
Chase.....C	3,000	1,950	138	pr-steel..	.....	solid....	36x3½	36x3½d	wood-ov.	3	4-3½x5½	19 61	block		cent...	fin-cast....	sing...	Bosch....	fixed....
Chase.....B	5,000	2,475	160	pr-steel..	.....	solid....	36x4	36x4d	wood ..	3	4-4½x5½	27.20	block		cent...	fin-cast....	sing...	Bosch....	fixed....
Chase.....X	6,000	.....	160	pr-steel..	.....	solid....	36x4	36x5d	wood ..	3	4-4½x5½	27 20	block		cent...	fin-cast....	sing...	Bosch....	fixed....
Chase.....O	7,000	3,300	175	pr-steel..	.....	solid....	36x5	36x5d	wood-ov.	3	4-4¼x6	29.00	block		cent...	fin-cast....	sing...	Bosch....	fixed....
Collier.....M	1,500	800	118	rolled-c.	semi-flx..	pneu....	33x4	33x4	wood-ov.	3	4-3½x5	16.92	block...	right	thermo.	z-z-t-sheet.	sing...	Conn....	hand....
Columbia.....E	4,000	1.750	144*	pr-steel..	.....	solid....	36x4	36x6	wood-sq	3	4-4½x5½	27 20	block	right	cent...	z-z-t-cast..	sing...	Eisemann.	hand....
Commerce.....N	1,500	975-c	120	pr-steel.	flexible..	pneu	34x4	34x4	wood-sq	3	4-3½x5	19 61	block	left	thermo.	fin-cast....	sing...	Eisemann.	fixed....
Commerce.....E	2,000	1,175	126	pr-steel.	flexible..	solid....	34x3	34x4	wood-sq	3	4-3½x5	19 61	block	left	thermo.	fin-cast....	sing...	Remy.....	hand....
Continental (C).....FL	2,000	1,550	144	.....	.....	solid....	34x3	36x4	.....	3	4-3½x5½	22 50	pairs	left	cent...	fin-cast....	sing...	Bosch*...	fixed....
Continental (C).....HL	3,000	1,750	144	.....	.....	solid....	34x3½	36x5	.....	3	4-3½x5½	22 50	pairs	left	cent...	fin-cast....	sing...	Bosch*...	fixed....
Continental (C).....J	4,000	2,100	146	.....	.....	solid....	36x4	36x4d	.....	3	4-4 x5½	27 20	pairs	left	cent...	cell-cast...	sing...	Bosch*...	fixed....
Continental (C).....M	7,000	3,000	168*	.....	.....	solid....	36x5	36x5d	.....	3	4-4½x5½	32 40	pairs	left	cent...	cell-cast...	sing...	Bosch*...	fixed....
Corbitt.....D	3,000	2,150	138	pr-steel..	rigid....	solid....	36x3½	36x5	wood-sq	3	4-3½x5½	22 50	block	right	cent...	fin-cast....	sing...	Eisemann.	hand....
Corbitt.....C	4,000	2,400	148	pr-steel.	rigid....	solid....	36x3½	36x3½d	wood-sq	3	4-4 x5½	27 20	block	right	cent...	fin-cast....	sing...	Eisemann.	hand....
Corbitt.....	5,000	2,650	148	pr-steel..	rigid....	solid....	36x4	36x4d	wood-sq	3	4-4 x5½	27 20	block	right	cent...	fin-cast....	sing...	Eisemann.	hand....

ABBREVIATIONS: General, *, *with other options;* opt, *optional;* **Price, -c, *complete with body.* **Frame, Material,** pr-steel, *pressed steel;* rolled-c, *rolled steel, channel section;* rolled-I, *rolled steel, I section;* **Frame Construction,** semi-flx, *semi flexible.* **Tires, kind,** Pneu, *pneumatic;* cush, *cushion,* p & s, *pneumatic front, solid, rear;* s & st, *solid rubber front, steel in rear.* **Tire Sizes,** -d, *dual.* **Wheels,** pr-steel, *pressed steel;* -ov, *oval spokes;* -sq, *square spokes;* -d, *disk or web type;* -hol, *hollow spokes;* -cr, *cruciform spokes;* -x, *cross-shaped solid spokes.* **Cylinders cast,** sing, *singly or individually.* **Location of valves,** opp, *opposite, T-head motor;* r & h, *one valve at right, the other in head, L-head motor;* l & h, *one valve at left the other in head, L-head motor.* **Water circulation,** cent, *centrifugal pump;* thermo-, *thermo-syphon or natural circulation;* gear, *gear pump.* **Radiator Type,** fin, *individually finned tubes;* sq-t, *square-tubular, resembling cellular, sometimes known as flat-tubular;* z-z-t, *zig-zag tubular, resembling cellular,* cell, *cellular or honeycomb type;* tube, *plain tubes without fins;* ring, *tubes arranged in ring about blower fan.* **Radiator Case,** -sheet, *sheet metal;* -cast, *cast metal, built up.* **Ignition Type,** sing, *single;* doub, *double,* dual-d, *dual-double.* **Make of Magneto** (or other sparking device), Conn., *Connecticut;* storage, *storage battery;* Westghs, *Westinghouse;* G & D, *Gray & Davis;* At Kent, *Atwater Kent.* **Spark Advance,** auto, *automatic;* 2-pt-fix, *two-point fixed, battery circuit in retard, magneto in advance.* **Electric System Type,** s, l & i, *starting, lighting and ignition, combination unit;* s & l, *starting and lighting, combination unit;* s & l-2, *starting and lighting, two-unit;* l & i, *lighting and ignition, combination unit.* **Electric System, Make,** Splitdf, *Splitdorf;* Al-Chal,—**(Abbreviations Continued on Opposite Page.)**

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Produced by 137 American Manufacturers, with Full Particulars of —Two Steam Models of One Maker Included

MOTOR										TRANSMISSION							BRAKES		CONTROL		
ELECTRIC SYSTEM			GOVERNOR			SPEED		FUEL SYSTEM			GEARSET			Total Gear Reduction in High	Final Drive	Propulsion Taken By	Torque Taken By					Name and Model
Type	Make	Extra Cost	Type	Drive	Make	Motor in r. p. m.	Truck in m. p. h.	Carbureter Make	Fuel Feed	Tank Location	Clutch Type	Type	Location	Sp'ds						Steer	Levers	
.....	.....	.....	.....	.....	.....	.....	.....	Scheb..	grav.	seat..	none..	elec..	amid...	2	28.00–1	int-g-f..	rad-rd..	rad-rd..	ex-r-w..	ex-f-w..	right.	right.	A & B. 3T
.....	.....	.....	.....	.....	.....	.....	.....	Scheb..	grav.	seat..	none..	elec..	amid...	2	28.00–1	int-g-f..	rad-rd..	rad-rd..	ex-r-w..	ex-f-w..	right.	right.	A & B. 5T
.....	.....	.....	cent..	motor..	Wauk'a..	1,100	17½	Scheb..	vac..	.....	dry-d..	selec.	unit-m.	4	.....	worm..	springs.	springs.	int-r-w.	int-r-w.	right.	cent..	Acason. 2
.....	.....	.....	cent..	motor..	Wauk'a..	1,100	13½	Scheb..	vac..	.....	dry-d..	selec.	unit-m.	4	.....	worm..	springs.	springs.	int-r-w.	int-r-w.	right.	cent.	Acason. . . . .
.....	.....	.....	cent..	motor..	Pierce...	1,700	22	Ray...	vac..	.....	dry-d..	selec.	unit-m.	3	7.75–1	worm..	springs.	springs.	int.....	int.....	left..	cent..	Acme. . . . . B
lighting.	.....	..opt..	cent..	motor..	Pierce...	1,300	17	Ray...	vac..	.....	dry-d..	selec.	unit-m.	3	8.50–1	worm..	springs.	springs.	int.....	int.....	.....	cent..	Acme. . . . . A
lighting.	.....	..opt..	cent..	motor..	Pierce...	1,200	14	Ray...	vac..	.....	dry-p..	selec.	amid...	3	10.25–1	worm..	rad-rd..	springs.	int-r-w.	int-r-w.	left..	cent..	Acme. C
lighting.	.....	60.00	cent..	drive-s.	Pierce*..	1,200	16	Scheb..	grav.	seat..	wet-d.	selec.	unit-m.	3	8.50–1	worm..	rad-rd..	springs.	int-r-w.	int-r-w.	left..	cent..	Armleder. HW2
lighting.	.....	60.00	cent..	motor*.	Pierce...	1,100	14	Scheb..	grav.	seat..	wet-d.	selec.	unit-m.	3	8.75–1	worm..	rad-rd..	springs.	int-r-w.	ext-sht.	left..	cent..	Armleder. . . . . KW
.....	.....	.....	.....	.....	.....	.....	.....	Carter..	grav.	seat..	wet-d.	selec.	unit-m.	3	4.75–1	sp-bev..	springs.	springs.	ext-r-w.	int-r-w.	left..	cent..	Atlas. 17
.....	.....	.....	cent..	motor..	Pierce...	1,200	16½	Zenith..	grav.	seat..	dry-d..	selec.	unit-m.	4	7.75–1	worm..	springs.	springs.	int-r-w.	int-r-w.	right.	right.	Atterbury. 6B
.....	.....	.....	cent..	motor..	Pierce...	1,200	15	Zenith..	grav.	seat..	dry-d..	selec.	unit-m.	4	7.75–1	worm..	springs.	springs.	int-r-w.	int-r-w.	right.	right.	Atterbury. 6R
.....	.....	.....	cent..	motor..	Pierce...	1,200	15	Zenith..	grav.	seat..	dry-d..	selec.	unit-m.	4	8.50–1	worm..	springs.	springs.	int-r-w.	int-r-w.	right.	right.	Atterbury. 6C
.....	.....	.....	cent..	motor..	Pierce...	1,125	13	Zenith..	grav.	seat..	dry-d..	selec.	unit-m.	4	10.33–1	worm..	springs.	springs.	int-r-w.	int-r-w.	right.	right.	Atterbury. 6D
.....	.....	.....	.....	.....	.....	.....	.....	Stmbg..	.....	seat..	dry-p..	prog.	amid...	3	7.14–1	db-red..	springs.	springs.	int-r-w.	ext-r-w.	right.	right.	Autocar. 21F
.....	.....	.....	none.	.....	.....	.....	.....	Stmbg.	grav.	seat..	dry-d..	selec.	unit-m.	3	7.00–1	worm..	springs.	springs.	int.....	int.....	left..	cent..	Available. 1
.....	.....	.....	none.	.....	.....	.....	.....	Stmbg	grav.	seat..	dry-d..	selec.	unit-m.	3	7.75–1	worm..	springs.	springs.	int.....	int.....	left..	cent..	Available. 2
.....	.....	.....	cent	motor..	Pierce...	1,300	15	.....	grav.	seat..	dry-d..	selec.	unit-m.	3	10.33–1	worm..	rad-rd..	springs.	int.....	int.....	left..	cent..	Available. 3
.....	.....	.....	cent	motor..	Pierce...	1,175	12	Stmbg	grav.	seat..	dry-d..	selec.	unit-m.	3	11.75–1	worm..	rad-rd..	springs.	int.....	int.....	left..	cent..	Available. 5
.....	.....	.....	cent	motor..	.....	1,200	15	Ray...	.....	.....	dry-d..	selec.	unit-m.	3	7.75–1	dbl chn.	.....	rad-rd..	.....	.....	left..	cent..	Avery. C
.....	.....	.....	l-b...	motor..	.....	1,200	14½	Ray...	.....	.....	dry-d..	selec.	unit-j..	3	3.50–1	dbl chn.	.....	rad-rd..	.....	.....	right.	cent..	Avery. . . . . B
.....	.....	.....	cent..	motor..	.....	1,200	13	Ray...	.....	.....	dry-p..	selec.	unit-j..	3	3.50–1	dbl chn.	.....	rad-rd..	.....	.....	right.	cent..	Avery. . . . . B
.....	.....	.....	cent..	motor..	.....	1,200	12	Ray...	.....	.....	dry-d..	selec.	unit-j..	3	3.50–1	dbl chn.	.....	rad-rd..	.....	.....	right.	cent..	Avery. . . . . A
.....	.....	.....	cent..	motor..	.....	1,000	10	Scheb..	.....	.....	wet-d.	selec.	unit-j..	3	12.50–1	dbl chn.	.....	rad-rd..	.....	.....	right.	cent..	Avery. . . . . B
.....	.....	.....	cent..	motor.	Wauk'a..	1,000	12	King...	vac..	seat..	dry-p..	selec.	amid...	6	8.03–1	bevel-4.	rad-rd..	springs.	ext-r-w.	ext-sht.	rt*...	cent..	Beech Creek. 3A
.....	.....	.....	.....	.....	none...	.....	.....	Scheb..	grav.	seat..	dry-d.	selec.	unit-m.	3	7.00–1	int-g...	springs.	springs.	int-r-w.	ext-r-w.	left..	cent	Bessemer. . . . . G
.....	.....	.....	cent .	motor.	Pierce...	.....	.....	Ray...	grav.	seat..	cone..	selec.	amid...	3	7.75–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	Bessemer. . . . . D
.....	.....	.....	cent..	.....	Pierce...	.....	.....	Ray...	grav.	.....	cone..	selec.	amid...	3	10.33–1	worm..	rad-rd..	springs.	int-r-w.	int-r-w.	left..	cent	Bessemer. . . . . E
.....	.....	.....	cent..	motor.	Pierce...	.....	.....	.....	grav.	seat..	cone..	selec.	amid...	3	13.00–1	worm..	rad-rd..	t-arm..	int-r-w.	ext-sht.	left..	cent..	Bessemer. . . . . H
.....	.....	.....	cent..	motor.	Wauk'a..	1,060	14	Scheb..	grav.	seat..	cone.	ind-c.	amid...	3	7.67–1	worm..	sub-f...	sub-f...	int-r-w.	ext-sht.	right.	right.	Blair. C
.....	.....	.....	cent..	motor.	Wauk'a..	970	12	Scheb..	grav.	seat..	cone.	ind-c.	amid...	3	8.67–1	worm..	sub-f...	sub-f...	int-r-w.	ext-sht.	right.	right.	Blair. . . . . D
.....	.....	.....	cent..	motor.	Wauk'a..	870	10	Scheb..	grav.	seat..	cone.	ind-c.	amid...	3	9.33–1	worm..	sub-f...	sub-f...	int-r-w.	ext-sht.	right.	right.	Blair. . . . . E
.....	.....	.....	cent..	motor.	Wauk'a..	870	10	Scheb..	grav.	seat..	cone.	ind-c.	amid...	3	9.33–1	worm..	sub-f...	sub-f...	int-r-w.	ext-sht.	right.	right.	Blair. . . . . F
lighting.	.....	.....	cent..	motor.	.....	.....	.....	.....	grav.	seat..	dry-d..	selec.	unit-m.	3	.....	worm..	.....	springs.	int.....	ext.....	.....	cent..	Brinton. . . . . H
lighting.	.....	stock..	cent..	motor.	.....	.....	.....	.....	grav.	seat..	dry-d..	selec.	unit-m.	3	.....	worm..	springs.	springs.	int.....	ext.....	.....	cent.	Brinton. . . . . F
s, l & i..	Splitdf..	stock..	.....	.....	.....	.....	.....	.....	grav.	dash.	cone..	selec.	unit-x..	3	4.23–1	bevel...	springs.	t-arm..	int-r-w.	ext-r-w.	left..	cent	Briscoe. 4–24
.....	.....	.....	suct..	motor..	Mon'rch.	1,400	18	Scheb..	grav.	seat..	dry-d..	selec.	unit-m.	3	7.90–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	Brockway. . . . . O
.....	.....	.....	suct.	motor..	Mon'rch.	1,250	15	Scheb..	grav.	seat..	cone..	selec.	amid...	3	8.66–1	worm..	springs.	springs.	int-r-w.	ext-r-w.	left..	cent..	Brockway. J–2
.....	.....	.....	suct.	motor..	Mon'rch.	1,250	15	Scheb..	grav.	seat..	cone..	selec.	amid...	3	8.66–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	Brockway. K–2
lighting.	.....	.....	suct.	motor.	Mon'rch.	1,200	12	Scheb.	grav.	seat..	dry-d..	selec.	amid...	3	10.33–1	worm..	rad-rd.	springs.	int-r-w.	int-r-w	left..	cent..	Brockway. . . . . R
lighting.	.....	stock..	.....	.....	none....	1,200	15	Zenith..	grav.	dash.	cone..	selec.	unit-m.	3	8.50–1	int-g...	springs	springs.	ext-sht.	ext-r-w.	right.	cent..	Burford. O–3
lighting.	.....	stock..	cent..	motor..	Wauk'a..	1,000	13	Zenith..	vac..	seat..	dry-d..	selec.	amid...	4	13.10–1	worm..	rad-rd.	springs.	-r-w.	int-r-w	right.	right.	Burford. D–3
lighting*	.....	stock..	.....	.....	Her-Sp..	1,500	.....	Stmbg..	grav.	seat.	.....	elec.	.....	1	25.00–1	bevel-4.	rad-rd..	rad-rd..	.....	ext-4-w.	right.	c & r.	Couple Gear. . . . . HC
lighting*	.....	stock..	c't*.	f-whl*..	Her-Sp*.	1,500	.....	Stmbg..	grav.	seat.	.....	elec.	amid...	1	25.00–1	bevel-4.	rad-rd..	rad-rd..	.....	ext-4-w.	right.	cent..	Couple Gear. . . . . AC
.....	.....	.....	suct..	motor.	Mon'rch.	1,200	18	Stmbg..	grav.	seat.	dry-d..	selec.	unit-m.	3	.....	worm..	springs	springs.	int-r-w.	int-r-w	right.	cent..	Chase. . . . . A
.....	.....	.....	suct.	motor.	Mon'rch.	1,000	15	Stmbg..	grav.	.....	dry-d..	selec.	unit-m.	3	.....	worm..	springs	springs.	int-r-w.	int-r-w	right.	cent..	Chase. C
.....	.....	.....	suct..	motor.	Mon'rch.	1,000	15	Stmbg..	grav.	seat.	dry-d..	selec.	unit-m.	3	.....	worm..	springs	springs.	int-r-w.	int-r-w	right.	cent.	Chase. . . . . B
.....	.....	.....	suct..	motor.	Mon'rch.	1,000	10	Stmbg..	grav.	.....	wet-d.	selec.	unit-m.	3	.....	worm..	springs	springs.	int-r-w.	int-r-w	right.	cent..	Chase. X
.....	.....	.....	suct..	motor.	Mon'rch.	1,000	10	Stmbg..	grav.	seat..	wet-d.	selec.	unit-m.	4	.....	worm..	springs	t-arm..	int.....	int.....	right.	cent..	Chase. . . . . O
s, l & i...	Dyneto..	stock..	.....	.....	none....	.....	35	Carter*	grav.	.....	dry-p.	selec.	unit-m.	3	6.00–1	bevel...	springs.	t-arm..	int-r-w.	ext-r-w.	left..	cent	Collier. . . . . M
none....	.....	.....	suct..	motor.	Mon'rch.	1,200	14	Shkspr	grav.	.....	cone..	selec.	amid...	3	9.45–1	int-g...	springs	springs.	int-r-w.	ext-r-w.	left..	cent..	Columbia. . . . . E
s, l & i...	.....	100.00	.....	.....	none....	1,630	25	Zenith..	grav.	seat.	cone..	selec.	unit-m.	3	6.00–1	bevel...	springs.	t-arm..	int-r-w.	ext-r-w.	left..	cent..	Commerce. . . . . N
s & l-2...	Remy...	stock..	cent..	d-shft..	Pierce...	1,383	20	Zenith..	vac..	seat..	cone..	selec.	unit-m.	3	7.00–1	int-g...	springs	springs	int-r-w.	ext-r-w.	left..	cent..	Commerce. . . . . E
.....	.....	.....	suct.	motor.	.....	.....	.....	Stmbg..	.....	.....	dry-d..	selec.	unit-m.	3	7.75–1	worm..	springs	springs.	.....	.....	left*	cent..	Continental (C). . . . . FL
.....	.....	.....	suct..	motor.	.....	.....	.....	Stmbg..	.....	.....	dry-d..	selec.	unit-m.	3	9.25–1	worm..	springs	springs.	.....	.....	left*	cent..	Continental (C). . . . . HL
.....	.....	.....	suct..	motor.	.....	.....	.....	Stmbg..	.....	.....	dry-d..	selec.	unit-m.	3	9.25–1	worm..	springs	springs.	.....	.....	left*	cent..	Continental (C). . . . . J
.....	.....	.....	suct..	motor.	.....	.....	18	Stmbg..	.....	.....	dry-d..	selec.	unit-m.	3	10.50–1	worm..	springs	springs	.....	.....	left*	cent..	Continental (C). . . . . M
.....	.....	.....	cent..	motor.	Pierce...	1,500	14	Stmbg..	grav.	seat..	dry-d..	selec.	unit-m.	3	8.66–1	worm..	springs	springs	int-r-w.	ext-r-w.	left.	cent..	Corbitt. . . . . D
.....	.....	.....	cent..	motor.	Pierce...	1,500	14	Stmbg..	grav.	seat..	dry-d..	selec.	unit-m.	3	8.66–1	worm..	springs	springs	int-r-w.	ext-r-w.	left.	cent.	Corbitt. C
.....	.....	.....	cent..	motor.	Pierce...	1,500	14	Stmbg..	grav.	seat.	dry-d..	selec.	unit-m.	3	8.66–1	worm..	springs	springs	int-r-w.	ext-r-w.	left.	cent.	Corbitt. . . . . B

ABBREVIATIONS: (continued).—*Allis-Chalmers*; G & D, *Gray & Davis*; Westghs, *Westinghouse*; N-East, *Northeast*; Huff-S, *Huff-Simms*; Spl-App, *Splitdorf-Apple*. **Governor Type** cent, c't, *centrifugal*; suct, *suction or gas velocity*; l-b, *loose-ball*; hydr, *hydraulic*. **Governor Drive** motor, *from motor*; d-shft, *from driveshaft*; duplex, *from both motor and driveshaft or front wheel*; f-whel, f-whl, *from front wheel*. **Governor Make** Wauk'a, *Waukesha*; Mon'rch, Mon, *Monarch*; Her-Sp, *Herschell-Spillman*; Milwkee, *Milwaukee*. **Carbureter Make,** Scheb, *Schebler*; Ray, *Rayfield*; Stmbg, *Stromberg*; Shkspr, *Shakespeare*; Flech, *Flechter*; Zen, *Zenith*, Johns, *Johnson*. **Fuel Feed,** grav, *gravity*; vac, *vacuum*; pres, *pressure*. **Tank Location,** seat, *under seat*; dash, *in dash*; rear, *at rear*; r-bd, *on running-board*. **Clutch Type,** dry-d, *dry multiple disk*; dry-p, *dry plate:* wet-d, *multiple-disk in oil*; wet-p, *plate-in-oil*. **Gearset Type,** selec, *selective sliding gear*; prog, *progressive sliding gear*; ind-c, *individual clutch, constant-mesh*; plan, *planetary*; fric, *friction*; elec, *electric*. **Gearset Location,** amid, *amidships*; unit-m, *unit with motor*; unit-j, *unit with jackshaft*; unit-x, *unit with axle*. **Final Drive,** int-g, *internal-gear*; worm, *top worm*; dbl chn, *double side chains*; sp-bevel, *spiral bevel*; db-red, *double-reduction, bevel and spur gears*; ext-g, *external-gear*; -f, *to front wheels*; -4, *on all four wheels*. **Propulsion Taken By,** rad-rd, *radius rods*; tor-t, *torsion-tube*; sub-f, *sub-frame*; spg's, *springs*. **Torque Taken By,** rad-rd, *radius rods*; tor-t, *torsion-tube*; t-arm, *torque-arm*; sub-f, *sub-frame*; sp'gs, *springs*. **Brakes, Type,** ext, ex, *external contracting*; int, *internal expanding*.* **Brake Location,** -r-w, *rear wheel*: -sht, *shaft*; -f-w, *front wheel*; -j-s, *jackshaft*; -4-w, *on all four wheels*. **Control, Levers,** cent, *center*; c & r, *gearshift center, brake right*; c & l, *gearshift center, brake left*.

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Technical Specifications of Gasoline

Name and Model	Capacity in Pounds	Price of Chassis	Wheel base in Inches	FRAME		TIRES			Wheels	MOTOR								
							SIZES IN INCHES			No. of Crank-shaft Bearings	Bore and Stroke	N.A.C.C. Hp.	Cylinders Cast	Valves Placed	COOLING		IGNITION		
				Material	Construction	Kind	Front	Rear							Water Circulation	Radiator Core and Case	Type	Make	Spark Advance
Corbitt....A	7,000	$3,200	168	pr-steel	rigid	solid	36x5	36x5d	wood-sq	3	4-4½x5½	32.40	pairs	right	cent	fin-cast	sing	Eisemann	hand
Corliss....A	1,000	800-c*	100	pr-steel	rigid	pneu	31x4	31x4	wood-ov	2	4-3½x4½	15.64	block	left	thermo	fin-sheet	sing	Dixie	hand
Crece....17	1,000	825	108	pr-steel		p. & s	32x4	32x4	wood-sq	2	4-3½x5	16.92	block	left	cent	sq-t-sheet	sing	Bosch	fixed
Crowther-Duryea	1,200	600-c	110	pr-steel	semi-flx	pneu	32x3½	32x3½	wood-ov	4	4-3½x4½	22.50	sing	head	thermo	cell-sheet	dual	Dixie	hand
Dart....B-B	1,500	1,200	124	pr-steel	flexible	solid	34x3	34x3½	wood-sq	3	4-3½x5½	19.61	block	right	thermo	cell-sheet	sing	Eisemann	fixed
Dart....E	3,000	1,800	130	pr-steel	flexible	solid	34x3½	34x5	wood-sq	3	4-3½x5½	22.50	block	right	thermo	cell-sheet	sing	Eisemann	fixed
Dart....C-C	5,000	2,470	150	pr-steel	flexible	solid	36x4	36x4d	wood-sq	3	4-4½x5½	27.20	block	right	cent	cell-sheet	sing	Eisemann	fixed
D-E....Junior	1,250	895	108	pr-steel	rigid	pneu	33x4	33x4	wood-ov	2	4-3½x4½	15.64	block	right	thermo	fin-sheet	sing	Dixie	hand
D-E....Senior	2,000	1,450	128*	pr-steel	rigid	solid	34x3½	34x4	wood-sq	3	4-3½x5	19.61	block	right	thermo	fin-sheet	sing	Dixie	hand
DeKalb....D-1½	4,000	2,100	134*	pr-steel	flexible	solid	34x4	36x5	wood-sq	3	4-4½x5½	27.20	block	left	cent	cell-sheet	sing	Eisemann	hand
DeKalb....D-2½	5,000	2,450	136*	pr-steel	flexible	solid	36x4	36x6	wood-sq	3	4-4½x5½	27.20	block	left	cent	cell-sheet	sing	Eisemann	hand
Denby....R	2,000	990	119	rolled-c	semi-flx	pneu*	34x4½*	34x4½*	wood-sq	2	4-3½x4½	15.64	block	right	thermo	cell-cast	sing	Dixie	fixed
Denby....G	3,000	1,575	120*	pr-steel	semi-flx	solid	35x3½	35x5	wood-sq	3	4-3½x5	19.61	block	right	thermo	cell-cast	sing	Eisemann	fixed
Denby....H	4,000	1,790	144*	pr-steel	semi-flx	solid	36x3½	36x3½d*	wood-sq	3	4-3½x5	22.50	block	right	thermo	cell-cast	sing	Eisemann	fixed
Denby....K	5,000	2,090	144*	pr-steel	semi-flx	solid	36x4	36x4d*	wood-sq	3	4-3½x5	22.50	block	right	thermo	cell-cast	sing	Eisemann	fixed
Dispatch....G	1,200	1,150	120	wood	flexible	pneu	36x3½	36x3½	wood-ov	3	4-3½x5	22.50	block	left	thermo	cell-sheet	sing	Bosch	hand
Doane	5,000	3,000-c	150	rolled-c	flexible	solid	36x4	36x7	wood-sq	3	4-4½x5½	29.00	pairs	right	cent	fin-cast	sing	Bosch	auto
Doane	12,000	4,500-c	178	rolled-I	flexible	solid	36x6	38x6d	wood-sq	3	4-4½x6½	36.15	pairs	left	cent	fin-cast	sing	Bosch	auto
Dorris....I-B-4	1,500	1,900	132	pr-steel	semi-flx	pneu	36x4	36x4½	wood-ov	3	4-4½x5	30.65	pairs	head	cent	s-s-t-sheet	dual	Bosch	hand
Dorris....I-B-W	4,000	1,990	132	pr-steel	semi-flx	pneu	36x4	36x4d	wood-sq	3	4-4½x5	30.65	pairs	head	cent	s-s-t-sheet	sing	Bosch	hand
Ellsworth....25-A	1,000	695-c	108	pr-steel	flexible	pneu	30x3½	30x3½	wood-ov	2	4-3½x5	16.92	block	right	thermo	sq-t-sheet	sing	storage	hand
Federal....S	2,000		132	pr-steel	semi-flx	solid*	34x3*	34x4*	wood-ov	5	4-3½x5½	19.61	block	right	cent	fin-sheet	sing	Eisemann	fixed
Federal....J-M	3,000	1,800	144*	pr-steel	semi-flx	solid	36x3½	36x5	wood-sq	2	4-4½x5½	27.20	block	left	cent	cell-cast	sing	Eisemann	fixed
Federal....O-P	4,000	2,100	144*	pr-steel	semi-flx	solid	36x4	36x7*	wood-sq	3	4-4½x5½	27.20	block	left	cent	cell-cast	sing	Eisemann	fixed
Federal....L	7,000	2,800*	146*	rolled-c	semi-flx	solid	36x5	36x5d	wood-sq*	3	4-4½x5½	32.40	pairs	left	cent	fin-cast	sing	Eisemann	fixed
Federal....W	10,000		156*	rolled-c	semi-flx	solid	36x6	40x6d*	cast-hol	5	4-4½x5½	29.00	block	right	cent	fin-sheet*	sing	Eisemann	fixed
Forschler	2,000	1,650	130	rolled-c	flexible	solid*	36x3	36x4	wood-sq	3	4-3½x5	19.61	block	right	cent	sq-t-sheet	sing	Bosch	fixed
Forschler	4,000	2,250	140*	rolled-c	flexible	solid*	34x3½	34x5	wood-sq	3	4-4½x5½	27.20	block	left	cent	sq-t-sheet	sing	Bosch	fixed
F. W. D....B	6,000	4,000	124	pr-steel		solid	36x6	36x6	wood-ov	3	4-4½x5½	36.15	pairs	opp	cent	sq-t-sheet	sing	Eisemann	hand
Garford....75	2,000	1,450	120	pr-steel	semi-flx	p. & s	34x4½	36x3½	wood-ov	3	4-3½x5½	19.61	block	right	thermo	cell-sheet	sing	Dixie	hand
Garford....66	3,000	1,800	142*	pr-steel	semi-flx	solid	36x3½	36x5	wood-ov	3	4-3½x5½	22.50	block	right	cent	cell-sheet	sing	Dixie	hand
Garford....70	4,000	2,300	142*	pr-steel	semi-flx	solid	36x4	36x4d	wood-ov	3	4-4½x5½	29.00	block	right	cent	fin-cast	sing	Dixie	hand
Garford....77-B	7,000	3,400	128*	pr-steel	semi-flx	solid	36x5	40x5d	wood-ov	3	4-4½x6	29.00	block	right	cent	cell-sheet	sing	Bosch	hand
Garford....68	10,000	4,300	128*	pr-steel	semi-flx	solid	36x6	40x6d	wood-ov	3	4-4½x5½	36.15	pairs	opp	cent	fin-cast	sing	Bosch	hand
Garford....69	12,000	4,500	128*	pr-steel	semi-flx	solid	36x6	40x7d	wood-ov	3	4-5 1/16x5½	41.61	pairs	opp	cent	fin-cast	sing	Bosch	hand
G. A. Schacht	3,000	2,650	138*	rolled-c	flexible	solid	38x3½	38x6	wood-sq	3	4-4½x5½	29.00	block	right	cent	cell-sheet	sing	Bosch	hand
G. A. Schacht	4,000	2,800	144*	rolled-c	flexible	solid	38x4	38x4d	wood-sq	3	4-4½x5½	29.00	block	right	cent	s-s-t-cast	sing	Bosch	hand
G. A. Schacht	6,000	3,200	168*	rolled-c	flexible	solid	38x5	38x5d	wood-sq	3	4-4½x5½	29.00	block	right	cent	s-s-t-cast	sing	Bosch	hand
G. V.-Mercedes....F.V.	12,000		192½	pr-steel	rigid	solid	34x5	40x6d	cast-d	3	4-4½x5 9/10	29.00	pairs	head	cent	sq-t-cast	sing	Bosch	fixed
Gersix....C	5,000	2,500	150*	rolled-c	rigid	solid	36x4	36x7	wood-ov	4	6-3½x5½	33.75	block	left	cent	cell-cast	sing	Westghs	hand
Globe	2,500	1,375	130*	rolled-c	semi-flx	solid	34x3½	34x4	wood-sq	3	6-3½x4½	25.39	block	left	cent	fin-cast	sing	Dixie	fixed
G. M. C....15	1,500	1,090	122	pr-steel	rigid	pneu	35x5	35x5	wood-ov	3	4-3½x5	19.61	block	right	cent	fin-sheet	sing	Eisemann	hand
G. M. C....21	2,000		136	pr-steel	semi-flx	solid	34x3½	34x5	wood-ov	3	4-3½x5	22.50	block	left	cent	fin-cast	sing	Eisemann	hand
G. M. C....31	3,000	1,900	144*	pr-steel	rigid	solid	36x3½	36x5	wood-ov	3	4-3½x5	22.50	block	right	cent	fin-cast	sing	Eisemann	hand
G. M. C....41	4,000	2,375	158*	pr-steel	rigid	solid	36x4	36x4d	wood-ov	3	4-4½x5½	27.20	block	right	cent	fin-cast	sing	Eisemann	hand
G. M. C....71	7,000	3,300	163*	rolled-c	rigid	solid	36x5	40x5d	wood-sq	3	4-4½x5½	32.40	pairs	left	cent	fin-cast	sing	Eisemann	hand
G. M. C....101	10,000	3,850	163*	rolled-c	rigid	solid	36x6	40x6d	wood-sq	3	4-4½x5½	32.40	pairs	left	cent	fin-cast	sing	Eisemann	hand
Gramm-Bernstein	2,000	1,650	124*	pr-steel	semi-flx	solid	34x3½	34x4	wood-sq	3	4-3½x5½	22.50	block	right	thermo	fin-cast	sing	Eisemann	hand
Gramm-Bernstein	3,000	2,000	130*	pr-steel	semi-flx	solid	34x3½	36x4	wood-sq	3	4-3½x5½	22.50	block	right	thermo	fin-cast	sing	Eisemann	hand
Gramm-Bernstein	4,000	2,300	146	pr-steel	semi-flx	solid	34x4	34x3½d	wood-sq	3	4-3½x5½	22.50	block	right	thermo	fin-cast	sing	Eisemann	hand
Gramm-Bernstein	5,000	2,700	156	pr-steel	semi-flx	solid	36x4	36x4d	wood-sq	3	4-4½x5½	29.00	pairs	left	cent	fin-cast	dual	Eisemann	hand
Gramm-Bernstein	7,000	3,400	158*	pr-steel	semi-flx	solid	36x5	40x5d	cast-hol	3	4-4½x5½	29.00	pairs	left	cent	fin-cast	dual	Eisemann	hand
Gramm-Bernstein	10,000	4,300	168*	pr-steel	semi-flx	solid	36x6	40x6d	cast-hol	3	4-4½x6½	32.40	pairs	left	cent	fin-cast	dual	Eisemann	hand
Gramm-Bernstein	12,000	4,500	168*	pr-steel	semi-flx	solid	36x6	40x7d	cast-hol	3	4-4½x6½	32.40	pairs	left	cent	fin-cast	dual	Eisemann	hand
Hahn....C	2,000	1,750	136*	pr-steel		solid	36x3½	36x5	wood-ov	3	4-4½x5½	2 .20	block	left	cent	sq-t-sheet	dual	Bosch	hand
Hahn....E	4,000	2,250	144*	pr-steel		solid	36x4	36x4d	wood-ov	3	4-4½x5½	32.40	pairs	left	cent	sq-t-sheet	dual	Bosch	hand
Hall	4,000	2,000	132	rolled-c	semi-flx	solid	36x4	36x4d	wood-sq*	3	4-4½x5½	27.20	block	left	cent	fin-cast	sing	Bosch*	fixed
Hall	7,500	2,800	144	rolled-c	semi-flx	solid	36x5	36x5d	wood-sq*	3	4-4½x5½	32.40	pairs	left	cent	fin-cast	sing	Bosch*	fixed
Hall	10,000	3,400	144	rolled-c	semi-flx	solid	36x5	40x6d	wood-sq*	3	4-4½x5½	32.40	pairs	left	cent	fin-cast	sing	Bosch*	fixed
Harrison....C	7,000			rolled-c	rigid	solid	37x5	37x4½d	wood-ov	3	4-4½x5	32.40	pairs	right	cent	sheet	dual	Bosch	hand
Harrison....F	7,000			rolled-c	rigid	solid	37x5	37x5d	wood-sq	3	4-4½x5	32.40	pairs	right	cent	sq-t-sheet	dual	Bosch	hand
Harvey....W-F	4,000	2,250	150	rolled-c	semi-flx	solid	36x4	36x6	wood-sq	3	4-4½x5½	29.00	block	right	cent	sq-t-sheet	sing	Eisemann	auto
Harvey....W-H	7,000	2,950	160*	rolled-c	semi-flx	solid	36x5	36x5d	wood-sq	3	4-4½x6	29.00	block	right	cent	sq-t-sheet	sing	Eisemann	auto
Harvey....W-K	10,000	3,600	160*	rolled-c	semi-flx	solid	36x6	40x6d	wood-sq	3	4-4½x6	32.40	block	right	cent	sq-t-sheet	sing	Eisemann	auto
Hawkeye....H	2,500	1,300	136*	rolled-c		solid	34x3½	34x5	wood-sq	3	4-3½x5	22.50	block	head	gear	fin-cast	sing	Eisemann	hand
Horner	3,000	2,250	145	pr-steel	rigid	solid	36x4	36x4	wood-sq	3	4-4½x5½	27.20	block		cent	fin-cast	dual		hand
Horner	4,000	2,650	145	pr-steel	rigid	solid	36x4	36x3½d	wood-sq	3	4-4½x5½	27.20	block		cent	fin-cast	dual		hand

ABBREVIATIONS: General, *, *with other options;* opt, *optional;* **Price,** -c, *complete with body.* **Frame, Material,** pr-steel, *pressed steel;* rolled-c, *rolled steel, channel section;* rolled-I, *rolled steel, I section;* **Frame Construction,** semi-flx, *semi flexible.* **Tires, kind,** Pneu, *pneumatic;* cush, *cushion,* p & s, *pneumatic front, solid, rear;* s & st, *solid rubber front, steel in rear.* **Tire Sizes,** -d, *dual.* **Wheels,** pr-steel, *pressed steel;* -ov, *oval spokes;* -sq, *square spokes;* -d, *disk or web type;* -hol, *hollow spokes;* -cr, *cruciform spokes;* -x, *cross-shaped solid spokes.* **Cylinders cast,** sing, *singly or individually.* **Location of valves,** opp, *opposite, T-head motor;* r & h, *one valve at right, the other in head, L-head motor;* l & h, *one valve at left the other in head, L-head motor.* **Water circulation,** cent, *centrifugal pump;* thermo-, *thermo-syphon or natural circulation;* **gear,** *gear pump.* **Radiator Type,** fin, *individually finned tubes;* sq-t, *square-tubular, resembling cellular, sometimes known as flat-tubular;* s-s-t, *zig-zag tubular, resembling cellular,* cell, *cellular or honeycomb type;* tube, *plain tubes without fins;* ring, *tubes arranged in ring about blower fan.* **Radiator Case,** -sheet, *sheet metal;* -cast, *cast metal, built up.* **Ignition Type,** sing, *single;* doub, *double,* dual-d, *dual-double.* **Make of Magneto** (or other sparking device), Conn., *Connecticut;* storage, *storage battery;* Westghs, *Westinghouse;* G & D, *Gray & Davis;* At Kent, *Atwater Kent.* **Spark Advance,** auto, *automatic;* 2-pt-fix, *two-point fixed, battery circuit in retard, magneto in advance.* **Electric System Type,** s, l & i, *starting, lighting and ignition, combination unit;* s & l, *starting and lighting, combination unit;* s & l-2, *starting and lighting, two-unit;* l & i, *lighting and ignition, combination unit.* **Electric System, Make,** Splitdf, *Splitdorf;* Al-Chal,—**(Abbreviations Continued on Opposite Page.)**

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Commercial Vehicles for 1917—Continued

MOTOR										TRANSMISSION						BRAKES		CONTROL		
ELECTRIC SYSTEM			GOVERNOR			SPEED		FUEL SYSTEM			GEARSET									Name and Model
Type	Make	Extra Cost	Type	Drive	Make	Motor in r. p. m.	Truck in m. p. h.	Carbureter Make	Fuel Feed	Tank Location	Clutch Type	Type	Location	Sp'ds	Total Gear Reduction in High	Final Drive	Propulsion Taken By	Torque Taken By	Hand	Foot	Steer	Levers	
.....	.....	.....	cent..	motor..	Pierce...	1,500	14	Stmbg..	grav.	seat..	wet-d.	ind-c.	amid...	3	8.75-1	worm..	springs.	springs	int.....	int.....	left..	cent..	Corbitt.....A
.....	.....	.....	.....	.....	.....	.....	.....	Scheb..	grav.	dash.	dry-d..	selec.	unit-m.	3	4.50-1	bevel...	tor-t...	tor-t...	int-r-w.	int-r-w.	left..	cent..	Corliss.....A
.....	.....	.....	.....	.....	none....	1,000	17½	Zenith..	grav.	seat..	dry-d..	selec.	unit-m.	3	5.00-1	bevel...	springs.	springs	int.....	ext-r-w.	left..	cent..	Croce.....17
s, l & i...	Splitdf..	stock..	.....	.....	none....	2,500	40	Scheb..	grav.	dash.	.....	roller	unit-x.	.....	.....	roller...	sub-f....	sub-f....	ext-r-w.	.....	left..	c & l..	Crowther-Duryea.....
none....	.....	.....	.....	.....	none....	.....	.....	.....	vac..	seat..	dry-d..	selec.	unit-m.	3	7.75-1	worm..	springs.	springs	int-r-w.	int-r-w.	left..	cent..	Dart.....B-B
.....	.....	.....	.....	.....	none....	.....	.....	Stmbg..	vac..	seat..	dry-d..	selec.	unit-m.	3	7.00-1	worm..	springs.	springs	int-r-w.	int-r-w.	left..	cent..	Dart.....E
none....	.....	.....	cent..	duplex..	Duplex*.	.....	.....	Stmbg..	vac..	seat..	dry-d..	selec.	unit-m.	4	9.25-1	worm...	springs.	springs	int-r-w.	int-r-w.	left..	cent..	Dart.....C-C
s & l....	Al-Chal..	85.00	.....	.....	.....	.....	.....	Scheb..	vac..	.....	dry-d..	selec.	unit-m.	3	6.20-1	worm..	springs.	springs	int-r-w	int-r-w	left..	cent..	D-E.....Junior
.....	.....	.....	suct..	motor..	Mon'rch.	1,250	16	Zenith..	vac..	seat..	dry-d..	selec.	unit-m.	3	7.80-1	worm..	springs.	springs	int-r-w.	int-r-w.	left..	cent..	D-E.....Senior
none....	.....	.....	cent..	motor..	Pierce...	1,800	15	Master.	grav.	seat..	cone..	selec.	unit-m.	3	6.83-1	worm..	springs	springs	int-r-w.	int-r-w.	left..	cent..	DeKalb.....D-1½
none....	.....	.....	cent..	motor..	Pierce...	1,800	13	Master.	grav.	seat..	dry-d..	selec.	unit-m.	3	8.25-1	worm..	springs	springs	int-r-w.	int-r-w.	left..	cent..	DeKalb.....D-2½
s & l....	Al-Chal..	85.00	cent..	motor..	Milwk...	1,800*	22*	Zenith..	grav.	dash.	dry-d..	selec.	unit-m.	3	8.20-1	int-g...	springs	springs	int-r-w	ext-r-w.	left..	cent..	Denby.....R
s & l-2...	G & D...	135.00	cent..	motor..	Pierce...	1,440	17	Stmbg..	grav.	dash.	dry-d..	selec.	unit-m.	3	8.80-1	int-g...	springs	springs	int-r-w.	ext-r-w.	left..	cent..	Denby.....G
s & l-2...	G & D...	135.00	cent..	motor..	Pierce...	1,320	15	Stmbg..	grav.	.....	dry-d..	selec.	unit-m.	3	9.45-1	int-g...	springs	springs	int-r-w.	ext-r-w.	left..	cent..	Denby.....H
s & l-2...	G & D...	135.00	cent..	motor..	Pierce...	1,240	14	Stmbg..	grav.	.....	dry-d..	selec.	unit-m.	3	9.45-1	int-g...	springs	springs	int-r-w.	ext-r-w.	left..	c & l..	Denby.....K
s & l....	U.S.L...	stock..	.....	.....	.....	2,000	25	Ray....	vac..	rear..	none	fric..	amid...	4	9.00-1	dbl chn.	rad-rd..	springs	int-r-w	int-r-w.	right.	cent..	Dispatch.....G
.....	.....	.....	.....	.....	Wauk'a..	1,000	14	Holley..	grav.	.....	dry-d..	selec.	unit-m.	3	8.00-1	dbl chn.	rad-rd.	.....	int.....	ext.....	right.	cent..	Deane.....
.....	.....	.....	cent..	motor..	Wauk'a..	1,000	10	Holley..	grav.	seat..	dry-d..	selec.	unit-m.	3	10.50-1	dbl chn.	rad-rd.	.....	int.....	ext.....	right.	cent..	Deane.....
lighting.	Westghs.	stock..	.....	.....	.....	.....	.....	Stmbg..	vac..	.....	dry-d..	prog.	unit-m.	3	4.08-1	sp-bev..	springs.	t-arm..	int-r-w.	ext-r-w.	left..	cent..	Derris.....I-B-4
.....	.....	.....	cent..	motor..	Pierce...	1,085	15	Stmbg..	grav.	seat..	dry-d..	selec.	unit-m.	3	7.75-1	worm..	springs	springs	int-r-w.	int-r-w.	left..	cent.	Derris.....I-B-W
s, l & i...	Apple...	stock..	.....	.....	.....	.....	.....	Carter..	grav.	seat..	cone..	selec.	unit-m.	3	4.46-1	bevel...	springs.	tor-t...	int-r-w.	int-r-w.	left..	cent..	Ellsworth.....25-A
s, l & i*.	.....	opt....	c't*..	motor*	Simplex*	1,067*	18*	Zenith..	grav.	seat..	dry-p..	selec.	amid...	3	6.00-1	worm..	rad-rd..	springs	int-r-w	int-r-w.	left*	cent..	Federal.....S
s & l-2...	Westghs.	245.00	cent..	motor..	own.....	1,190	15	Stmbg..	grav.	seat..	cone..	selec.	amid...	3	8.50-1	worm..	rad-rd..	springs	int-r-w	int-r-w.	left..	cent..	Federal.....J-M
s & l-2...	Westghs.	150.00	cent..	motor..	own.....	1,031	13	Stmbg..	grav.	seat..	cone..	selec.	amid...	3	8.50-1	worm..	rad-rd..	springs	int-r-w	int-r-w.	left..	cent..	Federal.....O-P
lighting.	Westghs.	150.00	cent..	motor..	own.....	1,160	12	Stmbg..	grav.	seat..	dry-d..	selec.	unit-m.	3	10.33-1	worm..	rad-rd..	springs	int-r-w	int-r-w.	right.	cent..	Federal.....L
s, l & i*.	.....	opt....	cent..	motor..	Simplex	1,000	10	Zenith..	grav.	seat..	dry-p..	selec.	amid...	4	11.60-1	worm..	rad-rd..	springs	int-r-w	int-r-w.	left*	cent..	Federal.....W
.....	.....	.....	suct..	motor..	Mon'rch.	1,200	16	Zenith..	grav.	seat..	dry-d..	selec.	unit-m.	3	7.75-1	worm..	springs	springs	int-r-w.	int-r-w.	left..	cent..	Forschler.....
.....	.....	.....	cent..	motor..	Pierce...	1,200	12	Zenith..	grav.	seat..	dry-d..	selec.	unit-m.	3	7.75-1	worm..	springs	springs	int-r-w.	int-r-w.	left..	cent..	Forschler.....
s & l....	N-East..	300.00	cent..	motor..	Pierce...	1,100	14	Stmbg..	grav.	seat..	wet-d.	ind-c.	amid...	3	8.90-1	bevel-4.	springs	t-arm..	ext-r-w.	ext-sht.	right.	right.	F. W. D.....B
s & l....	Westghs.	175.00	suct..	motor	Mon'rch.	1,238	17	Ray....	grav.	seat..	dry-d..	selec.	unit-m.	3	7.80-1	worm..	springs	springs	int-r-w.	int-r-w.	right.	cent..	Garford.....75
s & l....	Westghs.	175.00	suct..	motor	Mon rch.	1,111	14	Ray....	grav.	seat..	dry-d..	selec.	amid...	3	8.50-1	worm..	springs	springs	int-r-w.	ext-r-w.	right.	cent..	Garford.....66
s & l....	Westghs.	175.00	suct..	motor	Mon'rch.	934	13	Ray....	grav.	seat..	dry-d..	selec.	amid...	3	7.75-1	worm..	springs	springs	int-r-w.	ext-r-w.	right.	cent..	Garford.....70
s & l....	Westghs.	175.00	cent..	motor	own.....	1,041	12	Ray....	grav.	seat..	dry-d..	selec.	amid...	4	10.33-1	worm..	rad-rd..	springs	ext-sht.	int-r-w.	right.	cent..	Garford.....77-B
none....	.....	.....	suct..	motor..	own.....	1,005	9	Ray....	grav.	seat..	dry-d..	selec.	unit-j..	4	13.31-1	dbl chn.	rad-rd.	.....	int-r-w	ext-sht.	right.	right.	Garford.....68
none....	.....	.....	suct..	motor	own.....	920	8	Ray....	grav.	seat..	dry-d..	selec.	unit-j..	4	13.31-1	dbl chn.	rad-rd.	.....	int-r-w	int-sht..	right.	right.	Garford.....69
.....	.....	.....	cent..	motor..	own.....	900	16	Scheb..	grav.	seat..	cone..	selec.	amid...	3	7.75-1	worm..	rad-rd..	t-arm..	int-r-w.	ext-r-w.	left..	cent..	G. A. Schacht.....
.....	.....	.....	cent..	motor..	own.....	900	15	Scheb..	grav.	seat..	cone..	selec.	amid...	3	8.67-1	worm..	rad-rd..	t-arm..	int-r-w.	ext-r-w.	left..	cent..	G. A. Schacht.....
.....	.....	.....	cent..	motor..	own.....	900	12	Scheb..	grav.	seat..	cone..	selec.	amid...	3	9.67-1	worm..	rad-rd..	t-arm..	int-r-w.	ext-r-w.	left..	cent..	G. A. Schacht.....
.....	.....	.....	cent..	motor..	own.....	850	10	own....	pres.	seat..	cone..	selec.	amid...	4	9.36-1	int-g...	rad-rd.	t-arm..	ext-r-w.	ext-sht.	right.	right.	G. V.-Mercedes....F.V.
s & l-2...	Westghs.	stock...	suct..	motor..	Mon'rch.	1,050	13	Ray....	vac..	seat..	dry-p..	ind-c.	unit-m.	3	8.66-1	worm..	springs	springs	int-r-w	ext-r-w.	left..	cent..	Gersix.....C
.....	.....	.....	cent..	d-shft..	Pierce...	3,400	25	Master.	vac..	seat..	dry-d..	selec.	unit-m.	3	7.40-1	int-g...	springs	springs	int-r-w	ext-r-w.	left..	cent.	Globe.....
none....	.....	.....	suct..	motor..	Mon'rch.	1,150	20	Marvel.	grav.	seat..	cone..	selec.	amid...	3	6.00-1	bevel..	tor-t...	tor-t...	int-r-w.	ext-r-w.	left..	cent..	G. M. C.....15
none....	.....	.....	suct..	motor..	Mon'rch.	1,380	18	Marvel.	grav.	seat..	dry-d..	selec.	unit-m.	3	7.75-1	worm..	springs	springs	int-r-w	int-r-w.	left..	cent..	G. M. C.....21
none....	.....	.....	suct..	motor..	Mon'rch.	1,150	15	Marvel.	grav.	seat..	dry-d..	selec	unit-m	4	9.25-1	worm..	rad-rd.	springs	int-r-w	int-r-w.	left..	cent..	G. M. C.....31
none....	.....	.....	suct..	motor..	Mon'rch.	1,200	14	Marvel.	grav.	seat..	dry-d..	selec.	unit-m	4	9.25-1	worm..	rad-rd..	springs	int-r-w	int-r-w.	left..	cent..	G. M. C.....41
none....	.....	.....	suct..	motor..	Mon'rch.	1,250	12	Marvel.	grav.	seat..	dry-d..	selec.	amid...	4	12.00-1	worm..	rad-rd..	springs	int-r-w	int-r-w.	left..	cent..	G. M. C.....71
none....	.....	.....	suct..	motor..	Mon'rch.	1,250	10	Marvel.	grav.	seat..	dry-d..	selec.	amid...	4	13.67-1	worm..	rad-rd.	springs	int-r-w	int-r-w.	left..	cent..	G. M. C.....101
s & l-2*..	Westghs.	200.00*	l-b..	motor..	Wauk'a..	1,200	19	Zenith..	grav.	seat..	dry-d..	ind-c.	amid...	3	6.50-1	worm..	springs	springs	int-r-w	int-r-w.	left..	cent..	Gramm-Bernstein.....
s & l-2*..	Westghs.	200.00*	l-b..	motor..	Wauk'a..	1,200	17	Zenith..	grav.	seat..	dry-d..	ind-c.	amid...	3	7.75-1	worm..	springs	springs	int-r-w	ext-r-w.	left..	cent..	Gramm-Bernstein.....
s & l-2*..	Westghs.	200.00*	l-b..	motor..	Wauk'a..	1,200	14	Zenith..	grav.	seat..	dry-d..	ind-c.	amid	3	8.60-1	worm..	springs	springs	int-r-w	ext-r-w.	left..	cent..	Gramm-Bernstein.....
s & l-2*..	Westghs.	200.00*	cent..	motor..	Wauk'a..	1,000	14	Zenith..	grav.	seat..	dry-d..	ind-c.	amid	3	7.75-1	worm..	springs	springs	int-r-w.	ext-r-w.	left..	cent..	Gramm-Bernstein.....
s & l-2*..	Westghs.	200.00*	cent..	motor..	Wauk'a..	1,000	14	Zenith..	grav.	seat..	dry-d..	ind-c.	amid	4	8.75-1	worm..	springs	springs	int-r-w.	int-r-w.	left..	cent..	Gramm-Bernstein.....
s & l-2*..	Westghs.	200.00*	cent..	motor..	Wauk'a..	1,000	10	Zenith..	grav.	seat..	cone..	ind-c.	amid	4	11.75-1	worm..	springs	springs	int-r-w.	int-r-w.	left..	cent..	Gramm-Bernstein.....
s & l-2*..	Westghs.	200.00*	cent..	motor..	Wauk'a..	1,000	10	Zenith..	grav.	seat..	cone..	ind-c.	amid	4	11.75-1	worm..	springs	springs	int-r-w.	int-r-w.	left..	cent..	Gramm-Bernstein.....
.....	.....	.....	cent..	motor..	Pierce...	1,175	18	Stmbg..	grav.	seat..	dry-d..	selec.	unit-m.	3	7.00-1	worm..	springs	springs	int-r-w.	ext-r-w.	.....	cent..	Hahn.....C
.....	.....	.....	cent..	motor..	Pierce...	980	15	Stmbg..	grav.	seat..	dry-d..	selec.	unit-m.	3	7.00-1	worm..	rad-rd..	t-arm..	.....	.....	left..	cent..	Hahn.....E
lighting.	Bosch...	50.00	suct..	motor..	Mon'rch.	1,250	20	Zenith..	grav.	seat..	dry-d..	selec.	unit-m.	3	9.25-1	worm..	springs	springs	int-r-w	int-r-w.	left..	cent..	Hall.....
lighting.	Bosch...	50.00	suct*	motor..	Mon*....	1,200	15	Zenith..	grav.	seat..	dry-d..	selec.	unit-m.	3	10.51-1	worm*.	sp'gs*.	sp'gs*	int-r-w.	int-r-w.	left..	cent..	Hall.....
lighting.	Bosch...	50.00	suct*	motor..	Mon*....	1,200	12	Zenith..	grav.	.....	dry-d..	selec.	unit-m.	4	12.00-1	dbl chn.	rad-rd.	.....	int-r-w.	ext-j. s.	left..	cent..	Hall.....
.....	.....	.....	cent..	motor..	own.....	1,025	12	Scheb..	grav.	seat..	cone..	selec.	unit-j..	3	9.43-1	dbl chn.	rad-rd.	.....	int-r-w.	ext-r-w.	right.	right.	Harrison.....C
.....	.....	.....	cent..	motor..	own.....	1,000	12	Stmbg..	grav.	seat..	cone..	selec.	unit-j..	3	9.60-1	dbl chn.	rad-rd.	.....	int.....	ext.....	right.	cent..	Harrison.....F
s & l-2 ...	Westghs.	125.00	cent..	duplex..	Duplex..	1,000	14	Holley..	grav.	seat..	dry-p..	selec.	amid	4	7.75-1	worm..	springs.	springs	int-r-w.	int-r-w.	left..	cent..	Harvey.....W-F
s & l-2 ...	Westghs.	150.00	cent..	duplex..	Duplex..	1,000	13	Stmbg..	grav.	seat..	dry-p..	selec	amid	4	8.75-1	worm..	springs.	springs	int-r-w.	int-r-w	left..	cent..	Harvey.....W-H
s & l-2 ...	Westghs.	150.00	cent..	duplex..	Duplex..	900	11	Stmbg..	grav.	seat..	dry-p..	selec.	amid	4	11.75-1	worm..	springs	springs	int-r-w.	int-r-w.	left..	cent..	Harvey.....W-K
.....	.....	.....	.....	.....	.....	1,700	.....	Master.	vac..	.....	dry-p..	selec	unit-m.	3	.....	int-g...	springs	springs	int-r-w.	ext-r-w.	left..	cent..	Hawkeye.....H
.....	.....	.....	cent..	motor.	.....	.....	.....	.....	.....	.....	grav.	seat..	dry-d..	selec	.....	3	.....	worm..	rad-rd..	.....	int-r-w.	int-r-w.	left..	cent..	Horner.....
.....	.....	.....	cent..	motor.	.....	.....	.....	.....	.....	.....	grav.	seat..	dry-d..	selec	.....	.....	.....	worm..	rad-rd..	springs.	int-r-w.	int-r-w.	left..	cent..	Horner.....

ABBREVIATIONS: (continued).—*Allis-Chalmers*; G & D, *Gray & Davis*; Westghs, *Westinghouse*; N-East, *Northeast*; Huff-S, *Huff-Simms*; Spl-App, *Splitdorf-Apple*. **Governor Type** cent, c't, *centrifugal*; suct, *suction or gas velocity*; l-b, *loose-ball*; hydr, *hydraulic*. **Governor Drive** motor, *from motor*; d-shft, *from driveshaft*; duplex, *from both motor and driveshaft or front wheel*; f-wheel, f-whl, *from front wheel*. **Governor Make** Wauk'a, *Waukesha*; Mon'rch, Mon, *Monarch*; Her-Sp, *Herschell-Spillman*; Milwkee, *Milwaukee*. **Carbureter Make**, Scheb, *Schebler*; Ray, *Rayfield*; Stmbg, *Stromberg*; Shkspr, *Shakespeare*; Flech, *Flechter*; Zen *Zenith*, Johns, *Johnson*. **Fuel Feed**, grav, *gravity*; vac, *vacuum*; pres, *pressure*. **Tank Location**, seat, *under seat*; dash, *in dash*; rear, *at rear*; r-bd, *on running-board*. **Clutch Type**, dry-d, *dry multiple disk*; dry-p, *dry plate*: wet-d, *multiple-disk in oil*; wet-p, *plate-in-oil*. **Gearset Type**, selec, *selective sliding gear*; prog, *progressive sliding gear*; ind-c, *individual clutch, constant-mesh*; plan, *planetary*; fric, *friction*; elec, *electric*. **Gearset Location**, amid, *amidships*; unit-m, *unit with motor*; unit-j, *unit with jackshaft*; unit-x, *unit with axle*. **Final Drive**, int-g, *internal-gear*: worm, *top worm*; dbl chn, *double side chains*; sp-bevel, *spiral bevel*; db-red, *double-reduction, bevel and spur gears*; ext-g, *external-gear*; -f, *to front wheels*; -4, *on all four wheels*. **Propulsion Taken By**, rad-rd, *radius rods*; tor-t, *torsion-tube*; sub-f, *sub-frame*; sp'gs, *springs*. **Torque Taken By**, rad-rd, *radius rods*; tor-t, *torsion-tube*; t-arm, *torque-arm*; sub-f, *sub-frame*; sp'gs, *springs*. **Brakes, Type**, ext, ex, *external contracting*; int, *internal expanding*. **Brake Location**, -r-w, *rear wheel*: -sht, *shaft*; -f-w, *front wheel*; -j-s, *jackshaft*; -4-w, *on all four wheels*. **Control, Levers**, cent, *center*; c & r, *gearshift center, brake right*; c & l, *gearshift center, brake left*.

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Technical Specifications of Gasoline

Name and Model	Capacity in Pounds	Price of Chassis	Wheelbase in Inches	FRAME		TIRES			Wheels	MOTOR							IGNITION		
				Material	Construction	Kind	SIZES IN INCHES Front	SIZES IN INCHES Rear		No. of Crankshaft Bearings	Bore and Stroke	N.A.C.C. Hp.	Cylinders Cast	Valves Placed	COOLING Water Circulation	COOLING Radiator Core and Case	Type	Make	Spark Advance
Horner	6,000	$3,200	145	rolled-c..	rigid....	sold....	36x5	40x4d	wood-sq.	3	4-4½x5½	32.40	pairs....	opp....	cent...	fin-cast...	dual..	.....	hand...
Horner	10,000	4,200	156	rolled-c..	rigid....	soid....	38x6	42x6d	wood-sq.	3	4-5½x5½	44.20	pairs....	opp....	cent...	fin-cast...	dual..	.....	hand...
Hurlburt	3,000	2,250	136*	pr-steel..	rigid....	solid....	34x4	34x5	wood-ov.	3	4-3½x5½	22.50	block...	right...	cent...	cell-sheet..	sing..	Eisemann..	fixed...
Hurlburt	4,000	3,000	148*	pr-steel..	rigid....	solid....	36x4	36x4d	wood-ov.	3	4-4½x5½	27.20	block...	right...	cent...	fin-cast....	dual..	Eisemann..	fixed...
Hurlburt	7,000	3,500	146*	pr-steel..	rigid....	solid....	36x5	36x5d	wood-ov.	3	4-4½x5½	29.00	block...	right...	cent...	fin-cast....	dual..	Eisemann..	fixed...
Hurlburt	10,000	4,250	156*	pr-steel..	.....	solid....	36x5	38x6d	wood-ov.	4	6-3½x5½	33.75	block...	right...	cent...	fin-cast....	dual..	Eisemann..	fixed...
Hurlburt	14,000	5,000	156*	pr-steel..	.....	solid....	36x6	40x7d	wood-ov.	4	6-3½x5½	33.75	block...	right...	cent...	fin-cast....	dual..	Eisemann..	fixed...
Independent F	2,000	1,385	128*	pr-steel..	.....	solid*...	36x3*	36x4*	wood-sq.	3	4-3½x5	19.61	block...	.....	cent...	s-s-t-sheet.	sing..	Eisemann..	fixed...
Independent G	4,000	1,850	144	pr-steel..	.....	solid....	36x3½	36x5	wood-sq.	3	4-4½x5½	27.20	block...	.....	cent...	s-s-t-cast..	sing..	Eisemann..	fixed...
I.H.C. H	1,500	1,225	115	pr-steel..	semi-fix..	solid....	36x3	36x3½	wood-ov.	3	4-3½x5½	19.61	block...	right...	cent...	fin-sheet...	sing..	Bosch.....	hand....
I.H.C. F	2,000	1,500	128*	pr-steel..	semi-fix..	solid....	36x3½	36x4	wood-ov.	3	4-3½x5½	19.61	block...	right...	cent...	fin-sheet...	sing..	Bosch.....	hand...
Jeffery 1016	1,500	965	116	pr-steel..	flexible..	pneu....	35x4½	35x4½	wood-ov.	3	4-3½x5½	22.50	block...	right...	cent...	cell-sheet..	sing..	Dixie.....	hand...
Jeffery 2016	3,000	1,465	130	pr-steel..	flexible..	p & s...	34x4½	34x5	w'd-sq*..	3	4-3½x5½	22.50	block...	right...	cent...	cell-sheet..	sing..	Dixie.....	hand...
Jeffery Quad 4016	4,000	2,850	124*	pr-steel..	flexible..	solid....	36x5	36x5	cast-d...	3	4-4½x5½	29.00	block...	right...	cent...	cell-sheet..	sing..	Dixie.....	hand...
Kelly-Springfield K-31	3,000	2,000	144*	pr-steel..	semi-fix..	solid*...	36x3½*	36x6*	wood-sq.	3	4-3½x5½	22.50	block...	right...	cent...	cell-sheet..	sing..	Eisemann..	auto...
Kelly-Springfield K-32	3,000	2,000	144*	pr-steel..	semi-fix..	solid*...	36x3½*	36x6*	wood-sq.	3	4-3½x5½	22.50	block...	right...	cent...	cell-sheet..	sing..	Eisemann..	auto...
Kelly-Springfield K-36	5,000	2,750	144*	pr-steel..	semi-fix..	solid*...	36x4*	36x4d*	wood-sq.	3	4-3½x5½	22.50	block...	right...	cent...	cell-sheet..	sing..	Eisemann..	auto...
Kelly-Springfield K-35	5,000	2,750	144*	pr-steel..	semi-fix..	solid*...	36x4*	36x4d*	wood-sq.	3	4-3½x5½	22.50	block...	right...	cent...	cell-sheet..	sing..	Eisemann..	auto...
Kelly-Springfield K-40	7,000	3,400	150*	pr-steel..	semi-fix..	solid*...	38x5*	38x5d*	wood-sq.	3	4-4½x6½	32.40	pairs....	opp....	cent...	cell-sheet..	sing..	Eisemann..	auto...
Kelly-Springfield K-45	8,000	3,600	150*	pr-steel..	semi-fix..	solid*...	38x5*	40x6d*	wood-sq.	3	4-4½x6½	32.40	pairs....	opp....	cent...	cell-sheet..	sing..	Eisemann..	auto...
Kelly-Springfield K-50	10,000	4,250	150*	pr-steel..	semi-fix..	solid*...	38x6*	40x6d*	wood-sq.	3	4-4½x6½	32.40	pairs....	opp....	cent...	cell-sheet..	sing..	Eisemann..	auto...
Kelly-Springfield K-60	12,000	4,500	150*	pr-steel..	semi-fix.	solid*...	38x6*	40x7d*	w'd-sq*	3	4-4½x6½	32.40	pairs....	opp....	cent...	cell-sheet..	sing..	Eisemann..	auto...
King	7,000	2,600	120	rolled-c..	flexible..	solid....	36x5	36x5d	wood-sq.	3	4-4½x5½	32.40	pairs....	left....	cent...	s-s-t-sheet.	dual-d	Bosch....	2 pt-fix
Kisselkar	1,500	950	124	pr-steel..	rigid....	pneu....	32x4	32x4	wood-sq.	3	4-3½x5½	24.22	block...	right...	cent...	sq-t-sheet..	sing..	Eisemann..	hand...
Kisselkar	2,000	1,250	132	pr-steel..	rigid....	solid*...	34x3*	34x4*	wood-sq.	3	4-3½x5½	24.22	block...	right...	cent...	sq-t-sheet..	sing..	Eisemann..	hand...
Kisselkar	4,000	1,875	144*	pr-steel..	rigid....	solid....	34x3½	36x6	wood-sq.	3	4-4½x5½	29.00	block...	right...	cent...	sq-t-sheet..	sing..	Eisemann..	hand...
Kisselkar	5,000	2,250	166	pr-steel..	rigid....	solid....	34x4	36x4d	wood-sq.	3	4-4½x5½	29.00	block...	right...	cent...	sq-t-sheet..	sing..	Eisemann..	hand...
Kisselkar	8,000	2,850	168	pr-steel..	rigid....	solid....	36x5	36x5d	wood-sq.	3	4-4½x5½	29.00	block...	right...	cent...	sq-t-sheet..	sing..	Eisemann..	hand...
Kisselkar	10,000	3,350	180	pr-steel..	rigid....	solid....	36x6	36x6d	wood-sq.	3	4-4½x5½	29.00	block...	right...	cent...	sq-t-sheet..	sing..	Eisemann..	hand...
Kleiber AA	1,750	1,600	130*	rolled-c..	semi-fix	solid*...	34x3*	34x5*	wood-ov.	3	4-3½x5	22.50	block...	right...	thermo.	s-s-t-sheet.	dual..	Bosch.....	hand...
Kleiber A1	3,000	2,250	140*	rolled-c..	semi-fix..	solid....	36x3½	36x5*	wood-ov.	3	4-4½x5½	27.20	block...	left....	cent...	s-s-t-sheet.	dual..	Bosch.....	hand...
Kleiber A2	4,000	2,400	145*	rolled-c..	semi-fix..	solid....	36x3½*	36x6*	wood-sq.	.....	4-4½x5½	27.20	block...	left....	cent...	s-s-t-sheet.	dual..	Bosch.....	hand...
Kleiber B	5,000	2,750	150*	rolled-c..	semi-fix..	solid....	36x4	36x4d	wood-sq.	3	4-4½x5½	27.20	block...	left....	cent...	s-s-t-sheet.	dual..	Bosch.....	hand...
Kleiber C	7,000	3,500	160*	rolled-c..	semi-fix..	solid....	36x5	36x5d	wood-sq.	3	4-4½x5½	32.40	pairs....	left....	cent...	s-s-t-sheet.	dual..	Bosch.....	hand...
Kleiber D	10,000	4,500	170*	rolled-c..	semi-fix..	solid....	36x6	40x6d	wood-sq.	3	4-5½x5½	44.20	pairs....	opp....	cent...	s-s-t-sheet.	dual..	Bosch.....	hand...
Knickerbocker A	7,000	3,500	128	rolled-c..	rigid....	solid....	35x5	35x5d	wood-sq.	3	4-4½x5½	32.40	pairs....	left....	cent...	sq-t-sheet..	dual..	Bosch.....	hand....
Knickerbocker C	10,000	4,500	148*	rolled-c..	rigid....	solid....	36x6	36x6d	wood-sq.	3	4-4½x5½	32.40	pairs....	left....	cent...	sq-t-sheet..	dual..	Bosch.....	hand....
Knox Tractor 35	.....	4,500	108½	rolled-c..	rigid....	solid....	36x5	38x6d	cast-hol.	3	4-5x5½	40.00	pairs....	head....	cent...	cell-sheet..	sing..	Eisemann..	hand...
Knox Tractor 36	6,000	5,000	108½	rolled-c..	rigid....	solid*...	36x4	38x6d*	cast-hol..	3	4-5x5½	40.00	pairs....	head....	cent...	cell-sheet..	sing..	Eisemann..	hand...
Koehler K	2,000	895	129	rolled-c..	rigid....	solid....	34x3	34x3½	wood-sq.	3	4-3½x5	19.61	block...	head....	thermo.	fin-cast....	sing..	Heinse....	fixed...
Krebs 40	3,000	2,050	146	pr-steel..	.....	solid....	36x3½	36x5	wood-sq.	3	4-3½x5½	22.50	block...	left....	cent...	tube-cast..	sing..	Bosch.....	hand...
Krebs 60	4,000	2,375	162	pr-steel..	semi-fix..	solid....	36x4	36x4d*	wood-sq.	3	4-4½x5½	27.20	block...	left....	cent...	tube-cast..	sing..	Bosch.....	hand...
Krebs 90	7,000	3,250	180	pr-steel..	semi-fix..	solid....	36x5	36x5d	wood-sq.	3	4-4½x5½	32.40	pairs....	left....	cent...	tube-cast..	sing..	Bosch.....	hand...
Lambert V2	2,000	1,700	144	rolled-c..	semi-fix..	solid....	36x3½	36x4	wood-sq.	5	4-4½x5½	29.00	sing.....	left....	cent...	fin-sheet...	sing*.	Remy*....	hand...
Lane A	1,500	1,075	120	rolled-c..	.....	solid*...	34x3*	34x4*	wood-sq.	2	4-3½x5	16.92	block...	left....	thermo.	fin-cast....	sing..	G & D....	hand...
Lange C	3,000	1,850	130*	rolled-c..	rigid....	solid....	36x3½	38x4	wood-ov.	3	4-3½x5½	22.50	block...	right...	thermo.	sq-t-sheet..	sing..	Bosch.....	hand...
Lange B	5,000	2,450	136*	rolled-c..	rigid....	solid....	36x4	38x6	wood-ov.	3	4-4½x5½	27.20	block...	right...	thermo.	sq-t-sheet..	sing..	Bosch.....	hand...
Larrabee	2,000	1,550	130	pr-steel..	semi-fix..	solid*...	34x3*	34x4*	wood-sq.	3	4-3½x5	22.50	block...	right...	thermo.	sq-t-sheet..	sing..	G & D*....	hand...
Larrabee s	3,000	2,000	140*	pr-steel..	flexible..	solid....	36x3½	36x5	wood-sq.	3	4-4½x5½	27.20	block...	right...	cent...	sq-t-cast...	sing..	G & D*....	hand...
Larrabee	5,000	2,300	152*	pr-steel..	flexible..	solid....	36x4	36x6	wood-sq.	3	4-4½x5½	27.20	block...	right...	cent...	sq-t-cast...	sing..	G & D*....	hand...
Lawson 35	1,000	.....	112	pr-steel..	.....	pneu....	31x4	31x4	wood-ov.	3	4-3½x4½	22.50	block...	right...	thermo.	cell-sheet..	sing..	Dixie.....	hand...
Lincoln L	2,000	975	122*	pr-steel..	semi-fix..	pneu....	33x5	33x5	wood-ov.	3	4-3½x5	19.61	block...	right...	thermo.	tube-cast..	sing..	Dixie.....	fixed...
Lippard-Stewart MW	1,000	1,000	106	pr-steel..	semi-fix..	pneu....	33x4	33x4	wood-ov.	2	4-3½x5	16.92	block...	left....	thermo.	sq-t-sheet..	sing..	Berling...	fixed...
Lippard-Stewart W	1,500	1,600	125*	pr-steel..	semi-fix..	pneu....	35x4½	35x4½	wood-ov.	3	4-3½x5½	22.50	block...	left....	cent...	sq-t-sheet..	sing..	Eisemann..	fixed...
Lippard-Stewart H	2,000	2,000	145	pr-steel..	semi-fix..	solid....	36x3	36x5	wood-ov.	3	4-3½x5½	22.50	block...	left....	cent...	sq-t-cast...	sing..	Eisemann..	fixed...
Lippard-Stewart F	3,000	2,300	145*	pr-steel..	flexible..	solid....	36x3½	36x3d	wood-ov.	3	4-4½x5½	27.20	block...	left....	cent...	sq-t-cast...	sing..	Eisemann..	fixed...
Lippard-Stewart G	4,000	2,600	158*	pr-steel..	flexible..	solid....	36x4	36x4d	wood-ov.	3	4-4½x5½	27.20	block...	left....	cent...	sq-t-cast...	sing..	Eisemann..	fixed...
Little Giant 15	1,500	1,500	138	pr-steel..	semi-fix..	p. & s...	34x4	34x3½	wood-sq.	3	4-3½x5	19.61	block...	right...	thermo.	cell-sheet..	sing..	Eisemann..	hand...
Little Giant H	2,000	1,400	110	rolled-I..	semi-fix..	solid....	36x3	36x3½	wood-sq.	3	4-3½x5½	19.61	block...	right...	thermo.	s-s-t-sheet.	sing..	Eisemann..	hand...
Little Giant H	3,000	1,500	110	rolled-c..	semi-fix..	solid....	36x3½	36x4	wood-sq.	3	4-3½x5½	19.61	block...	right...	thermo.	s-s-t-sheet.	sing..	Eisemann..	hand...
Little Giant 16	4,000	2,500	144	pr-steel..	semi-fix..	solid....	36x4	36x6	wood-sq.	3	4-4½x5½	27.20	block...	left....	cent...	cell-sheet..	sing..	Eisemann..	hand...
Maccar L	3,000	2,100	150	pr-steel..	rigid....	solid....	36x4	36x5	wood-sq.	3	4-4½x5½	27.20	block...	left....	cent...	fin-sheet...	sing..	Bosch.....	hand...
Maccar H	5,000	2,600	162	pr-steel..	rigid....	solid....	36x4	36x4d	wood-sq.	3	4-4½x5½	32.40	pairs....	left....	cent...	cell-sheet..	sing..	Bosch.....	hand...
Maccar M	7,000	3,250	174	pr-steel..	rigid....	solid....	37x5	37x5d	wood-sq.	3	4-4½x5½	32.40	pairs....	left....	cent...	cell-sheet..	sing..	Bosch.....	hand...
Maccar U	11,000	.....	186	pr-steel..	rigid....	solid....	37x5	40x6d	wood-sq.	.....	4-4½x5½	32.40	pairs....	left....	cent...	cell-sheet..	sing..	Bosch.....	hand...
Mack AB	2,000	2,000	144*	pr-steel..	semi-fix..	solid....	36x4	36x3½d*	wood-sq.	3	4-4x5	25.60	pairs....	right...	cent...	cell-sheet..	sing..	Splitdorf..	hand...
Mack AB	2,000	2,000	144*	pr-steel..	semi-fix..	solid....	36x4	36x3½d*	wood-sq.	3	4-4x5	25.60	pairs....	right...	cent...	cell-sheet..	sing..	Splitdorf..	hand...
Mack AB	3,000	2,350	162*	pr-steel..	semi-fix..	solid....	36x4	36x3½d*	wood-sq.	3	4-4x5	25.60	pairs....	right...	cent...	cell-sheet..	sing..	Splitdorf..	hand...
Mack AB	3,000	2,350	162*	pr-steel..	semi-fix..	solid....	36x4	36x3½d*	wood-sq.	3	4-4x5	25.60	pairs....	right...	cent...	cell-sheet..	sing..	Splitdorf..	hand...
Mack AB	4,000	2,700	162*	pr-steel..	semi-fix..	solid....	36x4	36x4d	wood-sq.	3	4-4x5	25.60	pairs....	right...	cent...	cell-sheet..	sing..	Splitdorf..	hand...
Mack AB	4,000	2,700	162*	pr-steel..	semi-fix..	solid....	36x4	36x4d	wood-sq.	3	4-4x5	25.60	pairs....	right...	cent...	cell-sheet..	sing..	Splitdorf..	hand...
Mack AC	7,000	3,400	156*	pr-steel..	semi-fix..	solid....	36x5	40x5d	wood-sq.	3	4-5x6	40.00	pairs....	right...	cent...	ring-cast...	dual..	Bosch....	hand...

ABBREVIATIONS: General, *, *with other options;* opt, *optional;* **Price,** -c, *complete with body.* **Frame, Material,** pr-steel, *pressed steel;* rolled-c, *rolled steel, channel section;* rolled-I, *rolled steel, I section;* **Frame Construction,** semi-fix, *semi flexible.* **Tires, kind,** Pneu, *pneumatic;* cush, *cushion,* p & s. *pneumatic front, solid, rear;* s & st, *solid rubber front, steel in rear.* **Tire Sizes,** -d, *dual.* **Wheels,** pr-steel, *pressed steel;* -ov, *oval spokes;* -sq, *square spokes;* -d, *disk or web type;* -hol, *hollow spokes;* -cr, *cruciform spokes;* -x, *cross-shaped solid spokes.* **Cylinders cast,** sing, *singly or individually.* **Location of valves,** opposite, *T-head motor;* r & h, *one valve at right, the other in head, L-head motor;* l & h, *one valve at left the other in head, L-head motor.* **Water circulation,** cent, *centrifugal pump;* thermo-, *thermo-syphon or natural circulation;* gear, *gear pump.* **Radiator Type,** fin, *individually finned tubes;* sq-t, *square-tubular, resembling cellular, sometimes known as flat-tubular;* s-s-t, *zig-zag tubular, resembling cellular,* or *cellular or honeycomb type;* tube, *plain tubes without fins;* ring, *tubes arranged in ring about blower fan.* **Radiator Case,** -sheet, *sheet metal;* -cast, *cast metal, built up.* **Ignition Type,** sing, *single;* do-, *double,* dual-d, *dual-double.* **Make of Magneto** (or other sparking device), Conn., *Connecticut;* storage, *storage battery;* Westghs, *Westinghouse;* G & D, *Gray & Davis;* At Kent, *Atwater Kent.* **Spark Advance,** auto, *automatic;* 2-pt-fix, *two-point fixed, battery circuit in retard, magneto in advance.* **Electric System Type,** s, l & i, *starting, lighting and ignition, combination unit;* s & l, *starting and lighting, combination unit;* s & l-2, *starting and lighting, two-unit;* l & i, *lighting and ignition, combination unit.* **Electric System, Make,** Splitdf, *Splitdorf;* Al-Chal,—**(Abbreviations Continued on Opposite Page**

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Commercial Vehicles for 1917—Continued

MOTOR											TRANSMISSION							BRAKES		CONTROL		
ELECTRIC SYSTEM			GOVERNOR			SPEED		FUEL SYSTEM				GEARSET			Total Gear Reduction in High	Final Drive	Propulsion Taken By	Torque Taken By					Name and Model
Type	Make	Extra Cost	Type	Drive	Make	Motor in r.p.m.	Truck in m.p.h.	Carburetor Make	Fuel Feed	Tank Location	Clutch Type	Type	Location	Sp'ds					Hand	Foot	Steer	Levers	
.....	.....	.....	cent..	motor	.....	.....	.....	.....	grav.	.....	dry-d..	selec.	.....	3	9.40–1	worm..	rad-rd..	springs	int-r-w.	int-r-w.	left..	cent..	Horner.....
.....	.....	.....	cent.	motor	.....	.....	.....	.....	grav.	seat.	dry-d..	selec.	amid...	3	13.42–1	worm.	rad-rd..	springs	int-r-w.	int-r-w.	left..	cent..	Horner.....
lighting.	Vesta...	stock...	cent..	motor.	Pierce...	1,200	18	Flech..	grav	seat..	dry-d..	selec.	unit-m.	3	7.75–1	worm..	springs	springs	int-r-w.	int-r-w.	left..	cent..	Hurlburt.....
lighting.	Vesta...	stock...	cent..	motor.	Pierce...	1,200	16	Flech..	grav.	seat..	cone..	selec.	amid...	3	8.67–1	worm..	rad-rd..	t-arm.	int-r-w.	ext-r-w.	left..	cent..	Hurlburt.....
lighting.	Vesta...	stock...	cent..	motor.	Pierce...	1,200	13	Flech..	grav.	seat..	cone..	selec.	amid...	3	8.67–1	worm..	rad-rd..	t-arm.	int....	ext....	left..	cent..	Hurlburt.....
lighting.	Westghs	stock...	cent..	motor.	Pierce...	1,200	12	Flech..	grav.	seat..	dry-d..	selec.	amid...	3	10.33–1	worm..	rad-rd..	t-arm.	int-r-w.	int-r-w	left..	cent..	Hurlburt.....
lighting.	Westghs.	stock...	cent..	motor.	Pierce...	1,200	12	Flech..	grav.	seat..	dry-d..	selec.	amid...	4	11.33–1	worm.	rad-rd..	t-arm.	int-r-w.	ext-sht.	left..	cent..	Hurlburt.....
s, l & i...	Jesco....	100.00	suct..	motor.	Mon'rch.	1,350	.....	Marvel.	grav.	seat..	dry-d..	selec.	unit-m.	3	.....	worm..	springs	springs	int-r-w.	int-r-w.	left..	cent..	Independent.....F
.....	.....	.....	suct.	motor.	Mon'rch.	.....	.....	Marvel	grav.	seat..	dry-d.	selec.	unit-m	3	.....	worm..	springs	springs	int-r-w.	int-r-w.	left..	cent..	Independent.....G
s & l*...	N-East*.	125.00	cent..	motor.	own.....	1,275*	18*	Holley..	grav.	seat..	cone..	selec.	amid...	3	7.00–1	int-g...	springs	springs	int-r-w.	int-r-w.	left..	cent	I.H.C.....H
s & l*...	N-East*.	125.00	cent..	motor.	own.....	1,300	17	Holley..	grav	seat..	cone..	selec.	amid...	3	8.00–1	int-g...	springs	springs	int-r-w.	int-r-w.	left..	cent..	I.H.C.....F
s & l-2...	Bijur....	stock...	.....	.....	.....	1,750	40	Stmbg..	.....	.....	dry-p..	selec.	unit-m.	3	4.50–1	sp-bev..	springs	springs	ext-sht.	ext-r-w.	left..	cent..	Jeffery.....1016
s & l-2...	Bijur....	stock...	cent..	duplex..	Duplex...	1,500	16	Stmbg..	grav.	dash.	dry-p..	selec.	unit-m.	3	8.10–1	int-g...	springs	springs	ext-sht..	ext-r-w.	left..	cent.	Jeffery.....2016
s & l-2...	Bijur....	125.00	cent..	duplex..	Duplex...	1,500	14	Stmbg..	grav.	seat.	dry-p..	ind-c.	amid...	4	8.50–1	int-g-4.	springs	springs	ext-sht	int-4-w.	left..	cent..	Jeffery Quad.....4016
s & l-2...	R & M*.	175.00	l-b...	motor.	own.....	1,200	15	Ray...	grav.	seat..	cone..	selec.	amid...	3	.....	dbl chn.	rad-rd..	.....	int-r-w.	int-r-w.	left..	cent..	Kelly-Springfield..K-31
s & l-2...	R & M*.	175.00	l-b...	motor.	own.....	1,200	15	Ray...	grav.	seat..	cone..	selec.	amid...	3	.....	worm..	rad-rd..	springs	int-r-w.	int-r-w.	left..	cent..	Kelly-Springfield..K-32
s & l-2...	R & M*.	175.00	l-b...	motor.	own.....	1,200	11	Ray...	grav.	seat..	cone..	selec.	amid...	3	.....	worm..	rad-rd..	springs	int-r-w.	int-r-w.	left..	cent..	Kelly-Springfield..K-36
s & l-2...	R & M*.	175.00	l-b...	motor.	own.....	1,200	11½	Ray...	grav.	seat.	cone..	selec.	amid...	3	.....	dbl chn	rad-rd..	.....	int-r-w.	int-r-w.	left..	cent..	Kelly-Springfield..K-35
s & l-2...	R & M*.	175.00	l-b...	motor.	own.....	1,100	12	Ray...	grav.	seat.	cone..	selec.	amid...	3	.....	dbl chn	rad-rd..	.....	int-r-w.	int-r-w.	left..	cent..	Kelly-Springfield..K-40
s & l-2...	R & M*.	175.00	l-b...	motor.	own.....	1,100	12	Ray...	grav.	seat.	cone..	selec.	amid...	3	.....	dbl chn	rad-rd..	.....	int-r-w.	int-r-w.	left..	cent..	Kelly-Springfield..K-45
s & l-2...	R & M*.	175.00	l-b...	motor.	own.....	1,100	10½	Ray...	grav.	seat.	cone..	selec.	amid...	3	.....	dbl chn.	rad-rd..	.....	int-r-w.	int-r-w.	left..	cent.	Kelly-Springfield..K-50
s & l-2...	R & M*.	175.00	l-b....	motor.	own.....	1,100	10½	Ray...	grav	seat..	cone..	selec	amid...	3	.....	dbl chn.	rad-rd..	.....	.....	.....	left..	cent..	Kelly-Springfield..K-60
.....	.....	.....	cent..	motor.	Pierce...	1,000	12	Scheb..	grav.	seat..	dry-d..	ind-c.	unit-j..	3	8.67–1	dbl chn.	rad-rd..	.....	int-r-w.	ext-j...	right.	right.	King.....
s & l-2*..	Remy...	150.00*	cent..	motor.	Pierce...	1,200	25	Stmbg..	vac..	seat.	cone..	selec.	unit-m.	3	4.58–1	sp-bev..	springs	springs	ext-r-w.	ext-r-w.	left..	cent..	Kissselkar.....
s & l-2*..	Remy...	150.00	cent.	motor.	Pierce...	1,280	20	Stmbg..	vac..	seat.	cone..	selec.	unit-m.	3	6.50–1	worm..	springs	springs	int-r-w.	int-r-w.	left..	cent.	Kissselkar.....
s & l-2*..	Remy...	150.00	cent.	motor.	Pierce...	1,295	15	Stmbg..	vac..	seat.	dry-p..	selec.	unit-m.	4	9.25–1	worm..	springs	springs	int-r-w.	int-r-w.	left..	cent..	Kissselkar.....
s & l-2*..	Remy...	150.00	cent.	motor.	Pierce...	1,060	13	Stmbg..	vac..	seat.	dry-p..	selec.	unit-m.	4	8.70–1	worm..	springs	springs	int-r-w.	int-r-w.	left..	cent..	Kissselkar.....
s & l-2*..	Remy...	150.00	cent.	motor.	Pierce...	1,425	13	Stmbg..	vac..	seat.	dry-p..	selec.	amid...	4	11.75–1	worm..	springs	springs	int-r-w.	int-r-w.	left..	cent..	Kissselkar.....
.....	.....	.....	cent	motor.	Pierce...	1,456	12	Stmbg..	vac..	seat.	dry-p.	selec.	amid...	4	13.00–1	worm..	springs	springs	int-r-w.	int-r-w.	left..	cent..	Kissselkar.....
lighting.	.....	.....	opt....	cent..	motor..	Pierce...	1,300	20	Scheb..	grav.	seat..	dry-p.	selec.	unit-m.	3	6.75–1	worm..	springs	springs	int	int.....	right.	cent .	Kleiber.....AA
lighting.	.....	.....	opt....	cent..	motor..	Pierce...	1,250	18	Scheb..	grav.	seat.	wet-d.	selec.	amid...	3	6.50–1	worm..	springs	springs	int	ext....	right.	cent.	Kleiber.....A1
lighting.	.....	.....	opt....	cent..	motor..	Pierce...	1,225	17	Scheb..	grav.	seat.	wet-d.	selec.	amid...	3	7.75–1	worm..	rad-rd	springs	int	ext....	right.	cent.	Kleiber.....A2
lighting.	.....	.....	opt....	cent..	motor..	Pierce...	1,200	16	Scheb..	grav.	.....	wet-d.	selec.	amid...	3	8.67–1	worm..	springs	springs	int	ext....	right.	cent..	Kleiber.....B
lighting.	.....	.....	opt....	cent..	motor..	Pierce...	1,150	14	Scheb..	grav.	seat..	wet-d	selec	amid...	3	8.75–1	worm..	springs	springs	int	int.....	right.	cent..	Kleiber.....C
lighting.	.....	.....	opt....	cent..	motor..	Pierce...	1,100	12	Scheb..	grav.	seat..	wet-d	selec	amid...	4	8.75–1	worm..	springs	springs	int	int.....	right.	cent..	Kleiber.....D
lighting.	.....	.....	stock...	cent..	motor..	Pierce...	1,500	12	Stmbg..	grav.	seat..	cone..	selec.	unit-m.	3	3.50–1	dbl chn.	rad-rd..	.....	int-r-w.	ext-f-w.	left..	left..	Knickerbocker.....A
lighting.	.....	.....	stock...	cent..	motor..	Pierce...	1,500	10	Stmbg..	grav.	seat.	cone..	selec.	unit-m.	3	3.50–1	dbl chn.	rad-rd..	.....	int-r-w.	ext-f-w.	left..	left..	Knickerbocker.....C
s & l-2...	Bijur....	stock...	.....	.....	none.....	.....	.....	Zenith..	vac..	r-bd..	dry-p..	selec.	unit-j..	3	9.60–1	dbl chn.	rad-rd..	.....	int-r-w.	ext-j-s.	left..	cent..	Knox Tractor.....35
s & l-2...	Bijur....	stock...	.....	.....	none.....	.....	.....	Zenith	vac..	r-bd..	dry-p..	selec.	unit-j..	3	12.05–1	dbl chn.	rad-rd..	.....	int-r-w.	ext-j-s.	left..	cent..	Knox Tractor.....36
none....	.....	.....	opt..	opt....	opt.....	2,050	30	Zephyr.	grav.	seat..	dry-d..	selec.	unit-m.	3	7.00–1	int-g...	springs	springs	int-r-w.	ext-r-w.	right.	cent..	Koehler.....K
.....	.....	.....	cent.	motor.	own.....	1,100	15	Zenith..	grav.	seat.	dry-d..	selec.	unit-m.	4	7.75–1	worm..	springs	springs	int-r-w.	int-r-w.	right.	cent..	Krebs.....40
.....	.....	.....	cent..	motor.	own.....	1,110	14	Zenith..	grav.	seat.	dry-d..	selec.	amid...	4	8.50–1	worm..	springs	springs	int-r-w.	int-r-w.	right.	right.	Krebs.....60
.....	.....	.....	cent..	motor.	own.....	1,160	12	Zenith..	grav.	seat.	dry-d..	selec.	amid...	4	10.33–1	worm.	rad-rd..	springs	int-r-w.	int-r-w.	right.	right.	Krebs.....90
s, l & i...	.....	100.00	cent..	motor.	Pierce...	1,500	.....	Scheb..	grav.	seat.	none..	fric..	amid...	inf...	.....	dbl chn.	rad-rd..	.....	int.....	ext....	left*	.....	Lambert.....V2
.....	G & D..	stock..	.....	.....	.....	.....	.....	Shkspr.	grav.	dash	wet-d.	selec.	unit-m.	3	6.20–1	worm..	springs	springs	int-r-w.	int-r-w.	left..	cent..	Lane.....A
none....	.....	.....	cent..	motor.	Pierce...	1,250	18	Stmbg..	grav.	seat..	wet-d.	ind-c.	unit-j..	3	8.05–1	dbl chn.	rad-rd..	.....	int-r-w.	ext-sht.	left..	cent..	Lange.....C
none....	.....	.....	cent..	motor.	Pierce...	1,250	15	Stmbg..	grav.	seat.	wet-d.	ind-c.	unit-j..	3	9.21–1	dbl chn.	rad-rd..	.....	int-r-w.	ext-sht.	left..	cent..	Lange.....B
s, l & i...	G & D..	stock...	cent..	motor.	Pierce...	1,200	18½	Scheb..	grav.	seat.	dry-d..	selec.	unit-m.	3	6.50–1	worm..	springs	springs	int-r-w.	int-r-w.	left..	cent..	Larrabee.....
s, l & i-2.	G & D..	stock...	cent..	motor.	Pierce...	1,200	15	Scheb..	grav.	seat.	dry-d..	selec.	unit-m.	3	7.75–1	worm..	springs	springs	int-r-w.	ext-r-w.	left..	cent..	Larrabee.....
s, l & i-2.	G & D..	stock...	cent..	motor.	Pierce...	1,200	14	Scheb..	grav.	seat..	dry-d..	selec.	unit-m.	3	8.66–1	worm.	springs	springs	int-r-w.	ext-r-w.	left..	cent..	Larrabee.....
s & l-2 .	Splitdf...	opt....	.....	.....	.....	.....	.....	Scheb..	grav.	seat..	wet-p	selec.	unit-m.	3	4.30–1	bevel..	springs	tor-t...	int.....	ext....	left..	cent..	Lawson.....35
s, l & i...	Delco...	100.00	suct..	motor.	Mon'rch.	1,500	20	Zenith..	vac..	.....	cone..	selec.	unit-m.	3	6.50–1	bevel...	.....	t-arm.	int-r-w.	ext-r-w.	left..	c & l..	Lincoln.....L
s & l-2 .	Remy...	stock..	.....	.....	none....	1,525	25	Zenith..	grav.	seat.	cone..	selec.	amid...	3	5.80–1	worm..	springs	springs	int-r-w.	int-r-w.	left..	cent..	Lippard-Stewart....MW
s & l....	Dyneto.	135.00	.....	.....	none....	1,182	20	Zen*....	grav.	.....	cone..	selec.	amid...	3	6.00–1	worm..	springs	springs	int-r-w.	int-r-w.	left..	cent..	Lippard-Stewart.....W
s & l....	Dyneto.	135.00	cent..	motor.	Pierce...	1,134	18	Zenith..	grav.	seat.	cone..	selec.	amid...	3	6.75–1	worm..	springs	springs	int.....	ext.....	left..	cent..	Lippard-Stewart.....H
s & l....	Dyneto.	135.00	cent..	motor.	Pierce...	1,300	18	Zen*....	grav.	seat.	cone..	selec.	amid...	3	7.75–1	worm..	springs	springs	int.....	int.....	left..	cent..	Lippard-Stewart.....F
s & l....	Dyneto.	135.00	cent..	motor.	Pierce...	1,295	15	Zen*....	grav.	seat.	cone..	selec.	amid...	3	9.25–1	worm..	springs	springs	int.....	int.....	left..	cent..	Lippard-Stewart.....G
lighting.	.....	stock..	.....	.....	.....	.....	.....	Scheb..	grav.	seat.	dry-d..	selec.	unit-m.	3	6.00–1	worm..	springs	springs	int-r-w.	int-r-w.	right.	cent.	Little Giant.....15
.....	.....	.....	.....	.....	.....	.....	.....	Scheb..	grav.	.....	wet-d.	.....	unit-j..	3	6.88–1	dbl chn.	rad-rd..	.....	ext.....	ext.....	right.	cent..	Little Giant.....H
.....	.....	.....	.....	.....	.....	.....	.....	Scheb..	grav.	seat.	wet-d.	selec.	unit-j..	3	6.88–1	dbl chn.	rad-rd..	.....	ext-r-w.	ext-j-s.	right.	cent..	Little Giant.....H
.....	.....	.....	.....	.....	.....	.....	.....	Scheb..	grav.	seat.	dry-d..	selec.	unit-m.	3	7.75–1	worm..	springs	springs	int-r-w.	int-r-w.	right.	cent..	Little Giant.....16
none....	.....	.....	cent..	motor.	Pierce...	1,000	16	Stmbg..	grav.	seat.	dry-d..	selec.	unit-m.	3	6.75–1	worm..	rad-rd..	springs	ext-r-w.	r-w..	left..	cent..	Maccar.....L
none....	.....	.....	cent..	motor.	Pierce...	1,000	13½	Stmbg..	grav.	seat.	dry-d..	selec.	unit-m.	3	7.75–1	worm..	rad-rd..	springs	int-r-w.	int-r-w.	left..	cent..	Maccar.....H
none....	.....	.....	cent..	motor.	Pierce...	1,000	10½	Stmbg..	grav.	seat.	dry-d..	selec.	unit-m.	3	10.20–1	worm..	rad-rd..	springs	int-r-w.	int-r-w.	left..	cent..	Maccar.....M
none....	.....	.....	cent..	motor.	Pierce...	1,000	8½	Stmbg..	grav.	seat.	dry-d..	selec.	amid...	4	13.66–1	worm..	rad-rd..	springs	int-r-w.	int-r-w.	left..	cent..	Maccar.....U
s & l-2...	Bosch...	250.00	cent..	motor.	own.....	1,160	19½	Stmbg..	grav.	seat.	dry-d	selec.	unit-m.	3	6.29–1*	dbl chn.	rad-rd.	.....	int-r-w	ext-sht.	left..	cent..	Mack.....AB
s & l-2...	Bosch...	250.00	cent..	motor.	own.....	1,160	17½	Stmbg..	grav.	seat.	dry-d..	selec.	unit-m.	3	7.00–1*	worm..	springs	springs	int-r-w.	int-r-w.	left..	cent..	Mack.....AB
s & l-2...	Bosch...	250.00	cent..	motor.	own.....	1,160	16	Stmbg..	grav.	seat.	dry-d..	selec.	unit-m.	3	7.75–1*	worm..	springs	springs	int-r-w.	int-r-w.	left..	cent..	Mack.....AB
s & l-2...	Bosch...	250.00	cent..	motor.	own.....	1,160	17½	Stmbg..	grav.	seat.	dry-d..	selec.	unit-m.	3	6.99–1*	dbl chn.	rad-rd..	.....	int-r-w.	ext-sht.	left..	cent..	Mack.....AB
s & l-2...	Bosch...	250.00	cent..	motor.	own.....	1,160	16	Stmbg..	grav.	seat.	dry-d..	selec.	unit-m.	3	7.75–1*	worm..	springs	springs	int-r-w.	int-r-w.	left..	cent..	Mack.....AB
s & l-2...	Bosch...	250.00	cent..	motor.	own.....	1,160	17½	Stmbg..	grav.	seat.	dry-d..	selec.	unit-m.	3	6.99–1*	dbl chn.	rad-rd..	.....	int-r-w.	ext-sht.	left..	cent..	Mack.....AB
s & l-2...	Bosch...	250.00	cent..	motor.	own.....	1,000	15½	Stmbg..	grav.	seat.	dry-p..	selec.	unit-j.	3	7.54–1*	dbl chn.	rad-rd.	.....	int-r-w.	ext-j-s.	left..	cent..	Mack.....AC

ABBREVIATIONS: (continued).—*Allis-Chalmers*; G & D, *Gray & Davis*; Westghs, *Westinghouse*; N-East, *Northeast*; Huff-S, *Huff-Simms*; Spl-App, *Splitdorf-Apple*. **Governor Type** cent, c't, *centrifugal*; suct, *suction or gas velocity*; l-b, *loose-ball*; hydr, *hydraulic*. **Governor Drive** motor, *from motor*; d-shft, *from driveshaft*; duplex, *from both motor and driveshaft or front wheel*; f-wheel, f-whl, *from front wheel*. **Governor Make** Wauk'a, *Waukesha*; Mon'rch, Mon, *Monarch*; Her-Sp, *Herschell-Spillman*; Milwkee, *Milwaukee*. **Carburetor Make**, Scheb, *Schebler*; Ray, *Rayfield*; Stmbg, *Stromberg*; Shkspr, *Shakespeare*; Flech, *Flechter*; Zen, *Zenith*, Johns, *Johnson*. **Fuel Feed**, grav, *gravity*; vac, *vacuum*; pres, *pressure*. **Tank Location**, seat, *under seat*; dash, *in dash*; rear, *at rear*; r-bd, *on running-board*. **Clutch Type**, dry-d, *dry multiple disk*; dry-p, *dry plate*: wet-d, *multiple-disk in oil*; wet-p, *plate-in-oil*. **Gearset Type**, selec, *selective sliding gear*; prog, *progressive sliding gear*; ind-c, *individual clutch, constant-mesh*; plan, *planetary*; fric, *friction*; elec, *electric*. **Gearset Location**, amid, *amidships*; unit-m, *unit with motor*; unit-j, *unit with jackshaft*; unit-x, *unit with axle*. **Final Drive**, int-g, *internal-gear*; worm, *top worm*; dbl chn, *double side chains*; sp-bevel, *spiral bevel*; db-red, *double-reduction, bevel and spur gears*; ext-g, *external-gear*; -f, *to front wheels*; -4, *on all four wheels*. **Propulsion Taken By**, rad-rd, *radius rods*; tor-t, *torsion-tube*; sub-f, *sub-frame*; spg's, *springs*. **Torque Taken By**, rad-rd, *radius rods*; tor-t, *torsion-tube*; t-arm, *torque-arm*; sub-f, *sub-frame*; sp'gs, *springs*. **Brakes, Type**, ext, ex, *external contracting*; int, *internal expanding*. **Brake Location**, -r-w, *rear wheel*: -sht, *shaft*; -f-w, *front wheel*; -j-s, *jackshaft*; -4-w, *on all four wheels*. **Control, Levers**, cent, *center*; c & r, *gearshift center, brake right*; c & l, *gearshift center, brake left*.

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Technical Specifications of Gasoline

Name and Model	Capacity in Pounds	Price of Chassis	Wheelbase in Inches	FRAME		TIRES			WHEELS	MOTOR									
				Material	Construction	Kind	SIZES IN INCHES Front	SIZES IN INCHES Rear		No. of Crankshaft Bearings	Bore and Stroke	N.A.C.C. Hp.	Cylinders Cast	Valves Placed	COOLING Water Circulation	COOLING Radiator Core and Case	IGNITION Type	IGNITION Make	IGNITION Spark Advance
Mack.....AC	11,000	$4,000	156*	pr-steel..	semi-flx..	solid....	36x6	40x6d	wood-sq.	3	4–5x6	40.00	pairs....	right...	cent...	ring-cast..	dual..	Bosch....	hand....
Mack.....AC	15,000	4,500	156*	pr-steel..	semi-flx..	solid....	36x7	40x7d	wood-sq.	3	4–5x6	40.00	pairs....	right...	cent...	ring-cast..	dual..	Bosch....	hand....
Mack Tractor.....AC	14,000	3,400	119	pr-steel..	semi-flx..	solid....	36x5	40x5d	wood-sq.	3	4–5x6	40.00	pairs....	right...	cent...	ring-cast..	dual..	Bosch....	hand....
Mack Tractor.....AC	22,000	4,000	119	pr-steel..	semi-flx..	solid....	36x6	40x6d	wood-sq.	3	4–5x6	40.00	pairs....	right...	cent...	ring-cast..	dual..	Bosch....	hand....
Mack Tractor.....AC	30,000	4,500	119	pr-steel..	semi-flx..	solid....	36x7	40x7d.	wood-sq.	3	4–5x6	40.00	pairs....	right...	cent...	ring-cast..	dual..	Bosch....	hand....
Maxwell.....25	500	535	103	pr-steel..	flexible..	pneu....	30x3½	30x3½	wood-ov.	2	4–3¼x4½	21.08	block...	right...	thermo.	fin-sheet...	dual..	Simms....	hand....
Menominee.....EW	1,500	1,295	124	rolled-c..	semi-flx..	cush....	36x4	37x5½	wood-ov.	3	4–3½x5	22.50	block...	right...	thermo.	cell-sheet..	sing..	Bosch....	hand....
Menominee.....FW	2,000	1,575	130*	rolled-c..	semi-flx..	solid....	36x3½	36x5	wood-sq.	3	4–3½x5½	22.50	block...	left....	cent...	cell-sheet..	sing..	Bosch....	hand....
Menominee.....H	3,000	1,775	130*	rolled-c..	semi-flx..	solid....	36x3½	36x5	wood-sq.	3	4–3½x5½	22.50	block...	left....	cent...	cell-sheet..	sing..	Bosch....	hand....
Menominee.....D	4,000	2,240	144*	rolled-c..	semi-flx..	solid....	36x4	36x6*	wood-sq.	3	4–4¼x5½	27.20	block...	left....	cent...	cell-sheet..	sing..	Bosch....	hand....
Menominee.....G	7,000	2,775	160*	rolled-c..	semi-flx..	solid....	36x5	36x5d	wood-sq.	3	4–4½x5½	32.40	pairs....	left....	cent...	fin-cast....	sing..	Bosch....	hand....
Mercury Bulley Trac..A	.....	3,400	71	rolled-c..	rigid....	solid....	34x4	38x4d	wood-sq.	3	4–4¼x5	29.00	pairs....	opp....	cent...	cell-sheet..	dual..	Bosch....	hand....
Moreland.....15-D	2,000	1,650	126	pr-steel..	semi-flx..	solid....	34x3½	34x4	wood-sq.	3	4–3¾x5	22.50	block...	right...	thermo.	cell-cast...	sing..	Dixie....	hand....
Moreland.....15-B	3,000	1,950	126*	pr-steel..	semi-flx..	solid....	34x3½	34x5	wood-sq.	3	4–4¼x5½	27.20	block...	right...	cent...	cell-sheet..	sing..	Dixie....	hand....
Moreland.....15-C	5,000	2,550	144*	pr-steel..	semi-flx..	solid....	34x4	34x4d	wood-sq.	3	4–4½x5½	32.40	pairs....	right...	cent...	cell-sheet..	sing..	Dixie....	hand....
Moreland.....15-G	8,000	3,400	162*	pr-steel..	semi-flx..	solid....	36x5	38x5d	wood-sq.	3	4–4¾x6½	36.15	pairs....	right...	cent...	cell-sheet..	dual..	Dixie....	hand....
Moreland.....16-J	10,000	3,800	180*	pr-steel..	semi-flx..	solid....	36x6	40x6d	wood-sq.	3	4–4¾x6½	36.15	pairs....	right...	cent...	cell-sheet..	dual..	Dixie....	hand....
Moon.....B	3,000	1,600	140*	pr-steel..	rigid....	solid....	36x3½	36x4*	wood-ov.	3	4–3¾x5½	22.50	block...	head...	gear...	z-z-t-sheet	dual..	Remy*....	.....
Nelson & LeMoon...E1	2,000	1,700	opt...	.....	.....	solid....	36x3	36x4	.....	3	4–3¾x5½	22.50	block...	left....	cent...	sq-t-sheet..	sing..	Bosch....	.....
Nelson & LeMoon...E2	4,000	2,250	opt...	.....	.....	solid....	36x4	36x7	.....	3	4–4¼x5½	27.20	block...	left....	cent...	sq-t-sheet..	dual..	Bosch....	.....
Nelson & LeMoon...E3	6,000	2,950	opt...	.....	.....	solid....	36x5	38x5d	.....	3	4–4½x5½	32.40	pairs....	left....	cent...	sq-t-sheet..	dual..	Bosch....	auto....
Netco.....D	4,000	2,350	144*	pr-steel..	rigid....	solid....	36x4	36x6	wood-sq.	3	4–4¼x5½	27.20	block...	left....	cent...	fin-t-cast..	sing..	Eisemann..	fixed....
Netco.....E	4,000	2,600	144*	pr-steel..	semi-flx..	solid....	36x4	36x6	wood-sq.	3	6–3¾x5½	33.75	threes...	right...	cent...	fin-t-cast..	dual..	G & D....	hand....
New York.....M	3,000	2,200	144*	rolled-c..	semi-flx..	solid....	36x3½	36x5	wood-sq.	3	4–4¼x5½	27.20	block...	left....	cent...	sq-t-sheet..	sing..	Bosch....	fixed....
Niles.....B	2,000	1,175	124	pr-steel..	flexible..	pneu....	35x5	35x5	wood-ov.	3	4–3¼x5	19.61	block...	left....	thermo.	sq-t-sheet..	sing..	Eisemann..	hand....
Niles.....E	4,000	1,875	140*	pr-steel..	flexible..	solid....	36x4	36x7	wood-ov.	3	4–4¼x5½	27.20	block...	left....	cent...	z-z-t-sheet	sing..	Eisemann..	hand....
Old Hickory.....	1,250	825	112	rolled-c..	semi-flx..	pneu....	33x4	33x4	wood-ov	.....	4–3¼x5	16.92	block...	right...	thermo.	cell-sheet..	sing..	Conn.....	hand....
Old Reliable.....	3,000	1,950	150*	pr-steel..	semi-flx..	solid....	34x3	36x6	wood-sq.	3	4–3¾x5	22.50	block...	left....	cent...	sq-t-sheet..	sing..	Bosch....	hand....
Old Reliable.....	4,000	2,450	150	rolled-c..	semi-flx..	solid....	34x4	36x4d	wood-sq.	4	4–4x6	25.60	block...	left....	cent...	sq-t-sheet..	sing..	Bosch....	hand....
Old Reliable.....	5,000	2,750	.....	rolled-c..	rigid....	solid....	34x4	36x4d	wood-sq.	3	4–4½x5	29.00	pairs....	opp....	cent...	sq-t-sheet..	sing..	Bosch....	hand....
Old Reliable.....	6,000	3,250	150	rolled-c..	semi-flx..	solid....	34x5	36x5d.	wood-sq.	4	4–4¼x6	29.00	block...	left....	cent...	sq-t-sheet..	sing..	Bosch....	hand....
Old Reliable.....	8,000	3,750	.....	rolled-c..	semi-flx..	solid....	36x5	40x5d	wood-sq.	3	4–4¼x5½	36.15	pairs....	opp....	cent...	sq-t-sheet..	sing..	Bosch....	hand....
Old Reliable.....	8,000	3,750	.....	rolled-c..	.....	solid....	36x6	36x6d	wood-sq.	3	4–4¾x5½	36.15	pairs....	opp....	cent...	sq-t-sheet..	sing..	Bosch....	hand....
Old Reliable.....	10,000	4,500	150*	rolled-c..	rigid....	solid....	36x6	36x6d	wood-sq.	3	4–4¾x5½	36.15	pairs....	opp....	cent...	sq-t-sheet..	sing..	Bosch....	hand....
Old Reliable.....	14,000	5,000	150	rolled-c..	rigid....	solid....	36x6	40x7d	wood-sq.	3	4–5 1/16x5½	41.62	pairs....	opp....	cent...	sq-t-sheet..	sing..	Bosch....	hand....
Overland.....75-B	800	625-c	104	pr-steel..	.....	pneu....	31x4	31x4	wood-ov.	2	4–3¼x5	18.21	block...	right...	thermo.	cell-sheet..	.....	storage....	hand....
Overland.....	1,200	725	106	pr-steel.	.....	pneu....	33x4½	33x4½	wood-ov.	5	4–4¼x4½	27.20	block...	right...	thermo.	cell-sheet..	.....	Dixie....	hand....
Packard.....1-D	2,000	2,200	126*	rolled-c..	.....	solid....	34x3½	34x6	wood-sq.	3	4–4x5½	25.60	block...	right...	cent...	cell-sheet..	dual..	Dixie....	hand....
Packard.....1½-D	3,000	2,500	126*	rolled-c..	.....	solid....	34x3½	34x3½d	wood-sq.	3	4–4x5½	25.60	block...	right...	cent...	cell-sheet..	dual..	Dixie....	hand....
Packard.....2-D	4,000	2,800	144*	rolled-c..	.....	solid....	34x4	34x4d	wood-sq.	3	4–4x5½	25.60	block...	right...	cent...	cell-sheet..	dual..	Dixie....	hand....
Packard.....3-D	6,000	3,400	156*	rolled-c..	.....	solid....	36x5	36x5d	wood-sq.	3	4–4¼x5½	32.40	block...	right...	cent...	cell-sheet..	dual..	Dixie....	hand....
Packard.....4-D	8,000	3,800	156*	rolled-c..	.....	solid....	36x5	40x5d	wood-sq	3	4–4½x5½	32.40	block...	right...	cent...	cell-sheet..	dual..	Dixie....	hand....
Packet.....	600	350	100	pr-steel..	rigid....	pneu....	28x3	28x3	wood-ov.	2	4–2¾x4	12.08	block...	right...	thermo.	fin-sheet...	sing..	At Kent...	auto....
Palmer.....	2,000	1,350	132½	pr-steel..	rigid....	solid....	34x3½	34x4	wood-sq.	3	4–3¾x5	22.50	block...	right...	thermo	sq-t-cast..	sing..	Bosch....	fixed....
Palmer.....	4,000	1,975	144	pr-steel..	rigid....	solid....	36x3½	36x3½d	wood-sq.	3	4–4¼x5½	27.20	block...	left....	cent...	sq-t-cast..	sing..	Bosch....	fixed....
Palmer-Moore.....K	1,500	1,150	106	pr-steel..	rigid....	solid....	36x3	36x3½	wood-ov.	3	4–3¼x5½	19.61	block...	right...	thermo.	fin-cast....	sing..	Bosch....	auto....
Palmer-Moore.....M	2,000	1,350	126	pr-steel..	rigid....	solid....	36x3½	36x4	wood-sq.	3	4–3¼x5½	22.50	block...	right...	thermo	fin-cast....	sing..	Bosch....	auto....
Peerless.....TC2	4,000	.....	145	.....	.....	solid....	36x4	36x4d	.....	3	4–4½x6½	32.40	pairs....	opp....	gear...	fin-sheet...	dual..	Remy....	hand....
Peerless.....TC3	6,000	.....	151*	.....	.....	solid....	36x4	40x4d	.....	3	4–4½x6½	32.40	pairs....	opp....	gear...	fin-sheet...	dual..	Remy....	hand....
Peerless.....TC4	8,000	.....	151*	.....	.....	solid....	36x5	40x5d	.....	3	4–4½x6½	32.40	pairs....	opp....	gear...	fin-sheet...	dual..	Remy....	hand....
Peerless.....TC5	10,000	.....	151*	.....	.....	solid....	38x6	42x6d	.....	3	4–4½x6½	32.40	pairs....	opp....	gear...	fin-sheet...	dual..	Remy....	hand....
Peerless.....TC6	12,000	.....	151*	.....	.....	solid....	38x7	42x7d	.....	3	4–4½x6½	32.40	pairs....	opp....	gear...	fin-sheet...	dual..	Remy....	hand....
Pennsy.....15	1,000	660	98	pr-steel..	.....	pneu....	30x3½	31x4	wood-ov.	2	4–4¼x4½	27.20	block...	right...	thermo	fin-sheet	sing..	Dixie....	fixed....
Pierce-Arrow.....	4,000	3,000	150*	pr-steel..	flexible..	solid....	36x4	36x4d	wood-ov.	3	4–4x5½	25.60	pairs....	opp....	cent...	fin-cast....	sing..	Eisemann*.	hand....
Pierce-Arrow.....	10,000	4,500	168*	pr-steel..	flexible..	solid....	36x5	40x6d	wood-ov.	3	4–4¼x6	38.25	pairs....	opp....	cent...	fin-cast....	dual..	Bosch*....	hand....
Pullman.....4-24	1,000	.....	114	pr-steel..	semi-flx..	pneu....	31x4	31x4	wood-ov.	3	4–3¼x4½	22.50	block...	left....	thermo.	cell-sheet..	sing..	Dixie....	hand....
Rainier.....	1,000	850	115	pr-steel..	rigid....	pneu....	33x4	33x4	wood-sq.	2	4–3½x4½	16.92	block...	left....	thermo.	fin-sheet...	sing..	Dixie....	hand....
Reo.....F	1,500	1,000	120	pr-steel..	rigid....	pneu....	34x4½	34x4½	wood-ov.	3	4–4½x4½	27.20	pairs....	r&h....	cent...	fin-sheet...	sing..	Remy....	hand....
Reo.....J	4,000	1,650	146	pr-steel..	rigid....	solid....	36x4	36x3½d	wood-sq.	3	4–4½x4½	27.20	pairs....	r&h....	cent...	fin-cast....	dual..	National..	hand....
Republic.....9	1,500	750	120	pr-steel..	flexible..	cush....	32x3	32x3½	wood-sq.	2	4–3½x5	16.92	block...	left....	thermo.	sq-t-cast..	sing..	Bosch....	fixed....
Republic.....10	2,000	.....	124	pr-steel..	semi-flx..	solid....	34x3	34x4	wood-sq.	3	4–3½x5	19.61	block...	left....	thermo.	cell-cast...	sing..	Bosch....	fixed....
Republic.....11	3,000	.....	144	pr-steel..	semi-flx..	solid....	34x3	34x5	wood-sq.	3	4–3¾x5	22.50	block...	left....	thermo.	cell cast...	sing..	Bosch....	fixed....
Republic.....12	4,000	.....	144*	pr-steel..	semi-flx..	solid....	34x4	34x6	wood-sq.	3	4–4½x5½	27.20	block...	left....	cent...	cell-cast...	sing..	Bosch....	fixed....
Republic.....T	6,000	.....	165*	pr-steel..	semi-flx..	solid....	36x5	36x5d	cast-d...	3	4–4½x5½	29.00	block...	left....	cent...	cell-cast...	sing..	Bosch....	hand....
Riker.....	6,000	3,500	150*	pr-steel..	rigid....	solid....	36x5	36x5d	wood-sq	5	4–4¼x6	29.00	pairs....	opp....	cent...	fin-cast....	dual..	Bosch....	hand....
Riker.....	8,000	3,650	150*	pr-steel..	rigid....	solid....	36x5	36x6d	wood-sq.	5	4–4¼x6	29.00	pairs....	opp....	cent...	fin-cast....	dual..	Bosch....	hand....
Royal.....	2,000	.....	124*	rolled-c..	.....	solid....	34x4	34x5	wood-sq.	3	4–3½x5	16.92	block...	left....	cent	cell-cast	sing..	Bosch....	fixed....
Royal.....	5,000	.....	132*	rolled-c..	.....	solid....	36x4½	36x6	wood-sq.	3	4–4x6	25.60	block...	left....	cent	cell-cast	sing..	Bosch....	fixed....
Royal.....	7,000	.....	158*	rolled-c..	.....	solid....	36x5	38x5d	wood-ov.	3	4–4¼x6	29.00	block...	left....	cent	cell-cast	sing..	Bosch....	fixed....

ABBREVIATIONS: General, *, *with other options;* opt, *optional;* **Price, -c,** *complete with body.* **Frame, Material,** pr-steel, *pressed steel;* rolled-c, *rolled steel, channel section;* rolled-I, *rolled steel, I section;* **Frame Construction,** semi-flx, *semi flexible.* **Tires, kind,** Pneu, *pneumatic;* cush, *cushion,* p & s, *pneumatic front, solid, rear;* s & st, *solid rubber front, steel in rear.* **Tire Sizes, -d,** *dual.* **Wheels,** pr-steel, *pressed steel;* -ov, *oval spokes;* -sq, *square spokes;* -d, *disk or web type;* -hol, *hollow spokes;* -cr, *cruciform spokes;* -x, *cross-shaped solid spokes.* **Cylinders cast,** sing, *singly or individually.* **Location of valves,** opp, *opposite, T-head motor:* r & h, *one valve at right, the other in head, L-head motor;* l & h, *one valve at left the other in head, L-head motor.* **Water circulation,** cent, *centrifugal pump;* thermo-, *thermo-syphon or natural circulation;* gear, *gear pump.* **Radiator Type,** fin, *individually finned tubes;* sq-t, *square-tubular, resembling cellular, sometimes known as flat-tubular;* z-z-t, *zig-zag tubular, resembling cellular,* cell, *cellular or honeycomb type;* tube, *plain tubes without fins;* ring, *tubes arranged in ring about blower fan.* **Radiator Case,** -sheet, *sheet metal;* -cast, *cast metal, built up.* **Ignition Type,** sing, *single;* doub, *double,* dual-d, *dual-double.* **Make of Magneto** (or other sparking device), Conn., *Connecticut;* storage, *storage battery;* Westghs, *Westinghouse;* G & D, *Gray & Davis;* At Kent, *Atwater Kent.* **Spark Advance,** auto, *automatic;* 2-pt-fix, *two-point fixed, battery circuit in retard, magneto in advance.* **Electric System Type,** s, l & i, *starting, lighting and ignition, combination unit;* s & l, *starting and lighting, combination unit;* s & l-2, *starting and lighting, two-unit;* l & i, *lighting and ignition, combination unit.* **Electric System, Make,** Splitdf, *Splitdorf;* Al-Chal,—(Abbreviations Continued on Opposite Page.)

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Commercial Vehicles for 1917—Continued

MOTOR										TRANSMISSION								BRAKES		CONTROL		
ELECTRIC SYSTEM			GOVERNOR			SPEED		FUEL SYSTEM			GEARSET											
Type	Make	Extra Cost	Type	Drive	Make	Motor in r. p.m.	Truck in m. p. h.	Carburetor Make	Fuel Feed	Tank Location	Clutch Type	Type	Location	Sp'ds	Total Gear Reduction in High	Final Drive	Propulsion Taken By	Torque Taken By	Hand	Foot	Steer	Levers	Name and Model
s&l-2...	Bosch...	250.00	cent..	motor..	own....	1,000	14½	Stmbg..	grav.	seat..	dry-p..	selec.	unit-j..	3	8.40–1*	dbl chn.	rad-rd..	.....	int-r-w.	ext-j-s.	left..	cent..	Mack.....AC
s&l-2...	Bosch...	250.00	cent	motor..	own....	1,000	10½	Stmbg	grav.	seat..	dry-p..	selec.	unit-j..	3	11.58–1*	dbl chn.	rad-rd..	.....	int-r-w.	ext-j-s	left..	cent..	Mack.....AC
s&l-2	Bosch...	250.00	cent..	motor..	own....	1,000	9½	Stmbg..	grav.	seat..	dry-p .	selec.	unit-j..	3	12.42–1*	dbl chn.	rad-rd..	.....	int-r-w.	ext-j-s.	left..	cent..	Mack Tractor.....AC
s&l-2...	Bosch...	250.00	cent..	motor..	own....	1,000	10½	Stmbg..	grav.	seat..	dry-p..	selec.	unit-j..	3	11.58–1*	dbl chn.	rad-rd..	.....	int-r-w.	ext-j-s.	left..	cent..	Mack Tractor.....AC
s&l-2..	Bosch...	250.00	cent	motor..	own....	1,000	8½	Stmbg	grav.	seat..	dry-p..	selec.	unit-j..	3	14.10–1*	dbl chn.	rad-rd..	.....	int-r-w.	ext-j-s.	left..	cent..	Mack Tractor.....AC
s&l....	Huff-S..	stock...	none	.....	.....	.....	.....	K. D ..	grav.	dash.	cone..	selec.	unit-m.	3	3.59–1	bevel..	springs.	tor-t...	int-r-w.	ext-r-w.	left..	cent..	Maxwell.....25
none....	.....	.....	cent	d-shaft	own....	900	25	Stmbg	grav.	seat..	dry-d..	selec.	unit-m.	3	.....	worm..	rad-r...	springs.	int-r-w.	int-r-w.	left..	cent..	Menominee.....EW
none....	.....	.....	cent	d-shaft	own....	850	16	Stmbg	grav.	seat..	dry-d..	selec.	unit-m.	3	.....	worm..	rad-r...	springs.	int-r-w.	int-r-w.	left..	cent..	Menominee.....FW
none....	.....	.....	cent .	d-shaft	own....	800	15	Stmbg..	grav.	seat..	dry-d..	selec.	unit-m.	3	.....	worm..	rad-r...	springs.	int-r-w.	int-r-w.	left..	cent..	Menominee.....H
none....	.....	.....	cent..	d-shaft	own....	750	14	Stmbg..	grav.	seat..	dry-d..	selec.	unit-m.	3	.....	worm..	rad-r...	springs.	int-r-w.	int-r-w.	left..	cent..	Menominee.....D
none....	.....	.....	.....	.....	own....	750	12	Stmbg..	grav.	seat..	.....	.....	amid...	3	.....	worm..	rad-rd.	springs.	int-r-w.	int-r-w.	left..	cent..	Menominee.....G
lighting.	Bosch...	stock...	cent..	motor..	Pierce...	800	12	Stmbg..	grav.	seat..	dry-p..	ind-c.	unit-j..	3	14.00–1	dbl chn.	rad-rd.	.....	ext-j-s.	int-r-w	right.	right.	Mercury-Bulley Trac..A
lighting.	Westghs.	75.00	cent..	motor..	Pierce...	1,075	18	Ensign.	grav.	seat..	dry-d..	selec.	unit-m.	3	6.00–1	worm..	springs.	springs.	int-r-w.	ext-r-w.	right.	cent..	Moreland.....15–D
lighting.	Westghs.	75.00	cent..	motor..	Pierce...	1,200	18	Ensign.	grav.	seat..	dry-d..	selec.	unit-m.	3	6.75–1	worm..	rad-rd..	springs.	int-r-w.	int-r-w.	right.	cent..	Moreland.....15–B
lighting.	Westghs.	75.00	cent..	motor..	Pierce...	1,100	15	Ensign.	grav.	seat..	dry-d..	selec.	unit-m.	4	7.00–1	worm..	rad-rd..	springs.	int-r-w.	int-r-w.	right.	cent.	Moreland.....15–C
lighting.	Westghs.	75.00	cent..	motor..	Pierce...	890	12½	Ensign.	grav.	seat..	dry-d.	selec.	amid...	4	7.80–1	worm..	rad-rd.	springs.	int-r-w.	int-r-w.	right.	cent	Moreland.....15–G
lighting.	Westghs.	75.00	cent..	motor..	Pierce...	890	9	Ensign.	.....	.....	dry-d.	selec.	amid...	4	11.67–1	worm..	rad-rd.	springs.	int-r-w.	int-r-w.	right.	cent	Moreland.....16–J
none....	.....	.....	.....	.....	none....	1,800	18	Stmbg..	grav.	seat .	cone..	selec.	unit-j..	3	.....	dbl chn.	rad-rd.	.....	int-r-w.	int-r-w	left..	l & c..	Moon.....B
.....	.....	.....	suct..	motor..	Mon'rch.	1,000	16	Ray...	.....	.....	dry-d..	selec.	unit-m.	3	6.75–1	worm..	.....	.....	.....	.....	right.	cent..	Nelson & LeMoon...E1
.....	.....	.....	suct..	motor..	Mon'rch.	1,000	14	Ray...	.....	.....	dry d..	selec.	unit-m.	3	8.75–1	worm..	.....	.....	.....	.....	right.	cent..	Nelson & LeMoon...E2
.....	.....	.....	suct..	motor.	Mon'rch.	1,000	12	Ray...	.....	.....	dry-d..	selec.	unit-m.	3	8.75–1	worm..	.....	.....	.....	.....	right.	cent..	Nelson & LeMoon...E3
s, l&i...	G & D...	200.00	.....	.....	none....	1,800	15	Zenith..	grav.	seat..	dry-d..	selec.	unit-m.	3	8.50–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	Netco.....D
s, l&i...	G & D...	200.00	.....	.....	none....	.....	.....	Zenith..	grav.	seat..	dry-d..	prog.	unit-m.	3	8.50–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	Netco.....E
.....	.....	.....	cent.	motor.	Pierce...	1,400	18	Stmbg..	grav.	seat.	dry-p..	ind-c.	unit-m.	3	7.75–1	worm..	rad-rd..	springs.	int-r-w.	int-r-w.	left..	cent..	New York.....M
opt.....	.....	.....	cent..	motor..	Pierce...	1,573	25	Stmbg..	grav.	seat..	dry-d..	selec.	unit-m.	3	6.50–1	worm..	springs.	springs.	int-r-w.	int-r-w.	left..	cent..	Niles.....B
opt.....	.....	.....	cent..	motor..	Pierce...	1,173	15	Stmbg..	grav.	seat..	dry-p..	selec.	amid...	3	8.50–1	worm..	rad-rd..	springs.	int-r-w.	int-r-w.	left..	cent..	Niles.....E
s&l-2...	Dyneto..	stock...	.....	.....	.....	960	16	Carter..	grav.	seat..	cone..	selec.	unit-m.	3	6.00–1	bevel..	tor-t...	tor-t...	int-r-w.	ext-r-w.	left..	cent..	Old Hickory.....
lighting.	.....	stock...	.....	.....	.....	.....	.....	Stmbg..	grav.	dash.	dry-d..	selec.	unit-m.	3	7.75–1	worm..	springs.	springs.	int-r-w.	int-r-w.	right.	r & c.	Old Reliable.....
lighting.	.....	stock...	cent..	duplex..	Duplex..	.....	.....	Stmbg..	grav.	dash.	dry-d..	selec.	unit-m.	3	7.75–1	worm..	springs.	springs.	int-r-w.	int-r-w.	right.	cent..	Old Reliable.....
.....	.....	.....	.....	.....	.....	.....	.....	Stmbg..	grav.	seat..	wet-d.	selec.	unit-j..	3	.....	dbl chn.	rad-rd.	.....	int-r-w.	ext-j-s.	right.	right.	Old Reliable.....
lighting.	.....	stock...	cent..	duplex..	Duplex..	.....	.....	Stmbg..	vac..	.....	dry-d..	selec.	unit-m.	3	8.75–1	worm..	springs.	springs.	int-r-w.	int-r-w.	right.	cent..	Old Reliable.....
lighting.	.....	stock...	cent..	duplex..	Duplex..	.....	.....	Stmbg..	vac..	.....	dry-d..	selec.	amid...	4	8.75–1	worm..	springs.	springs.	int-r-w.	int-r-w.	right.	cent..	Old Reliable.....
lighting.	.....	stock...	.....	.....	.....	.....	.....	Stmbg..	grav.	seat..	wet-d	selec.	amid...	3	.....	dbl chn.	rad-rd.	.....	ext....	int....	right.	right.	Old Reliable.....
lighting.	.....	stock...	cent..	duplex..	Duplex..	.....	.....	Stmbg..	grav.	seat..	wet-d	selec.	amid...	3	.....	dbl chn.	rad-rd.	.....	ext-r-w.	int-j-s.	right.	right.	Old Reliable.....
lighting.	.....	stock...	cent..	duplex..	Duplex..	.....	.....	Stmbg..	grav.	.....	wet-d	selec.	unit-j..	4	.....	dbl chn.	rad-rd.	.....	int-r-w.	ext-j-s.	right.	right.	Old Reliable.....
s, l&i-2.	.....	stock...	.....	.....	none....	.....	.....	.....	grav.	dash.	cone..	selec.	unit-x..	3	.....	bevel..	tor-t...	tor-t...	ext-r-w.	ext-r-w.	left..	cent..	Overland.....75–B
s, l&i-2.	.....	stock...	.....	.....	none....	.....	.....	.....	grav.	seat..	cone..	selec.	unit-x..	3	.....	bevel..	tor-t...	tor-t...	ext-r-w.	ext-r-w.	left..	cent..	Overland.....
s&l-2...	Bijur....	180.00	cent..	motor.	own....	1,000	16	own...	pres.	seat..	dry-d..	prog.	amid...	3	6.25–1	worm..	rad-rd.	t-arm..	int-r-w.	ext-sht.	left..	left..	Packard.....1–D
s&l-2...	Bijur....	180.00	cent..	motor.	own....	1,000	16	own...	pres.	seat.	dry-d..	prog.	amid...	3	6.25–1	worm..	rad-rd.	t-arm..	int-r-w.	ext-sht.	left..	left..	Packard.....1½–D
s&l-2...	Bijur....	180.00	cent..	motor.	own....	1,000	14	own...	pres.	seat.	dry-d..	prog.	amid...	3	7.25–1	worm..	rad-rd.	t-arm..	int-r-w.	ext-sht.	left..	left..	Packard.....2–D
s&l-2...	Bijur....	180.00	hydr.	motor.	own....	1,000	12	own...	pres.	seat.	dry-d..	prog.	amid...	3	9.00–1	worm..	rad-rd.	t-arm..	int-r-w.	ext-sht.	left..	left..	Packard.....3–D
s&l-2..	Bijur....	180.00	hydr.	motor.	own....	1,000	12	own...	pres.	seat.	dry-d..	prog.	amid...	3	10.00–1	worm..	rad-rd.	t-arm..	int-r-w.	ext-sht.	left..	left..	Packard.....4–D
none....	.....	.....	.....	.....	none....	1,500	29	Carter..	grav.	dash.	none..	frict	unit-j..	3	4.25–1	dbl chn	rad-rd.	.....	int-r-w.	int-r-w	left..	left..	Packet.....
none....	.....	.....	.....	.....	none....	.....	18	Stmbg..	grav.	seat..	dry-d.	selec.	unit-m.	3	.....	int-g..	springs.	springs.	int-r-w.	ext-r-w.	left..	cent	Palmer.....
none....	.....	.....	cent..	motor.	Pierce...	1,000	15	Stmbg.	grav.	seat.	dry-d..	selec.	unit-m.	3	7.75–1	worm..	rad-rd.	springs.	int-r-w.	int-r-w.	left..	cent..	Palmer.....
s&l*...	opt.....	.....	suct..	motor.	Mon'rch.	1,275	20	Zenith..	grav.	seat.	dry-d..	selec.	amid...	3	6.83–1	int-g...	springs	t-arm..	int-r-w.	ext-r-w.	left..	cent..	Palmer-Moore.....K
s&l*...	opt.....	.....	suct..	motor.	Mon'rch.	1,150	18	Zenith..	grav.	seat.	dry-d..	selec.	amid...	3	6.83–1	int-g...	springs	t-arm..	int-r-w.	ext-r-w.	left..	cent..	Palmer-Moore.....M
.....	.....	.....	cent.	motor.	.....	.....	.....	Stmbg.	.....	.....	cone..	selec.	amid...	3	6.00–1	worm..	springs	springs	.....	.....	right.	right.	Peerless.....TC2
.....	.....	.....	cent..	motor.	.....	925	14½	Stmbg..	.....	.....	cone..	selec.	unit-j.	4	7.45–1	dbl chn.	rad-rd.	.....	.....	.....	right.	right.	Peerless.....TC3
.....	.....	.....	cent..	motor.	.....	.....	.....	Stmbg..	.....	.....	cone..	selec.	unit-j.	4	8.70–1	dbl chn.	rad-rd.	.....	.....	.....	right.	right.	Peerless.....TC4
.....	.....	.....	cent..	motor.	.....	.....	.....	Stmbg..	.....	.....	cone..	selec.	unit-j.	4	10.50–1	dbl chn.	rad-rd.	.....	.....	.....	right.	right.	Peerless.....TC5
.....	.....	.....	cent..	motor.	.....	.....	.....	Stmbg..	.....	.....	cone..	selec.	unit-j.	4	10.50–1	dbl chn.	rad-rd.	.....	.....	.....	right.	right.	Peerless.....TC6
.....	Dyneto..	75.00	.....	.....	none....	2,200	42½	Zenith..	grav.	seat..	dry-d..	selec.	unit-m.	3	4.75–1	bevel..	springs.	springs.	int.....	ext....	left..	cent..	Pennsy.....15
.....	.....	.....	cent..	motor.	own....	1,050	16	own...	grav.	seat..	cone..	selec.	amid...	3	7.00–1*	worm..	rad-rd.	t-arm..	int-r-w.	ext-sht.	right.	right.	Pierce-Arrow.....
.....	.....	.....	cent..	motor.	own....	950	14	own...	grav.	seat..	cone..	selec.	amid...	3	7.80–1*	worm..	rad-rd.	t-arm..	int-r-w.	ext-sht.	right.	right.	Pierce-Arrow.....
s&l-2...	Apple..	stock...	.....	.....	none....	2,800	35	Stmbg..	grav.	dash.	wet-d.	selec.	unit-m.	3	4.25–1	bevel..	springs.	t-arm..	int-r-w.	ext-r-w.	left..	cent..	Pullman.....4–24
s&l....	Spltdrf..	85.00	.....	.....	none....	2,500	42	Carter..	grav.	seat.	dry-p..	selec.	unit-m.	3	5.80–1	worm..	springs	springs	int-r-w.	int-r-w	left..	cent..	Rainier.....
s&l-2...	Remy....	stock...	.....	.....	none....	.....	.....	Johns..	grav.	dash.	dry-d..	selec.	amid...	3	4.30–1	sp-bev..	springs	t-arm..	none....	2 s-r-w.	left..	cent	Reo.....F
.....	.....	.....	hydr.	motor.	own....	1,250	14	Johns..	grav.	seat.	dry-d..	selec.	amid...	3	8.70–1	dbl chn.	rad-rd.	.....	ext-r-w	ext-j-s.	left..	cent	Reo.....J
lighting.	Bosch...	stock...	suct..	motor.	Ruggles.	1,050	20	.....	grav.	dash.	dry-d..	selec.	unit-m.	3	5.36–1	int-g...	springs	springs	ext-sht.	int-r-w.	left..	cent..	Republic.....9
s&l-2...	Bosch...	.....	suct.	motor.	Ruggles.	1,050	15	Stmbg.	grav.	seat.	dry-d..	selec.	unit-m.	3	7.00–1	int-g...	springs	springs	int-r-w.	ext-r-w.	left..	cent..	Republic.....10
s&l-2...	Bosch...	.....	suct.	motor.	Ruggles.	1,200	15	Stmbg.	grav.	seat.	dry-d.	selec.	unit-m.	3	8.00–1	int-g...	springs	springs	int-r-w.	ext-r-w.	left..	cent..	Republic.....11
s&l-2...	Bosch...	.....	suct.	motor.	Ruggles.	950	12	Stmbg.	grav.	seat.	dry-d..	selec.	unit-m.	3	8.00–1	int-g...	springs	springs	int-r-w.	ext-r-w.	left..	cent..	Republic.....12
s&l-2...	Bosch...	.....	suct.	motor.	Ruggles.	1,025	10	Stmbg.	grav.	seat.	dry-d..	selec.	unit-m.	4	11.00–1	int-g...	springs	springs	int-r-w.	ext-r-w.	left..	cent..	Republic.....T
s&l-2...	Westghs.	225.00	l-b..	motor	own....	1,180*	14½	own...	grav.	seat..	cone..	selec.	amid...	4	10.00–1	worm..	rad-rd.	t-arm..	int-r-w	ext-sht.	right.	right.	Riker.....
s&l-2...	Westghs.	225.00	l-b..	motor	own....	1,350*	14½	own...	grav.	seat..	cone..	selec.	amid...	4	10.00–1	worm..	rad-rd.	t-arm..	int-r-w	ext-sht.	right.	right.	Riker.....
starting.	.....	stock...	suct.	motor	Mon'rch.	1,600*	25*	Master.	grav.	seat..	dry-p..	ind-c.	amid...	3	.....	worm..	springs	springs	int-r-w	int-r-w.	right.	right.	Royal.....
starting.	.....	stock...	suct.	motor	Mon'rch.	1,600	18	Master.	grav.	seat.	dry-p..	ind-c.	amid...	3	.....	worm..	springs	springs	int-r-w	int-r-w.	right.	right.	Royal.....
starting.	.....	stock...	suct.	motor	Mon'rch.	1,600	15	Master.	grav.	seat.	dry-p..	ind-c.	amid...	3	.....	worm..	springs	springs	int-r-w	int-r-w.	right.	right.	Royal.....

ABBREVIATIONS: (continued).—*Allis-Chalmers*; G & D, *Gray & Davis*; Westghs, *Westinghouse*; N-East, *Northeast*; Huff-S, *Huff-Simms*; Spl-App, *Splitdorf-Apple*. **Governor Type** cent, c't, *centrifugal*; suct, *suction or gas velocity*; l-b, *loose-ball*; hydr, *hydraulic*. **Governor Drive** motor, *from motor*; d-shft, *from driveshaft*; duplex, *from both motor and driveshaft or front wheel*; f-wheel, f-whl, *from front wheel*. **Governor Make** Wauk'a, *Waukesha*; Mon'rch, Mon, *Monarch*; Her-Sp, *Herschell-Spillman*; Milwkee, *Milwaukee*. **Carbureter Make,** Scheb, *Schebler*; Ray, *Rayfield*; Stmbg, *Stromberg*; Shkspr, *Shakespeare*; Flech, *Flechter*; Zen, *Zenith*, Johns, *Johnson*. **Fuel Feed,** grav, *gravity*; vac, *vacuum*; pres, *pressure*. **Tank Location,** seat, *under seat*; dash, *in dash*; rear, *at rear*; r-bd, *on running-board*. **Clutch Type,** dry-d, *dry multiple disk*; dry-p, *dry plate*: wet-d, *multiple-disk in oil*; wet-p, *plate-in-oil*. **Gearset Type,** selec, *selective sliding gear*; prog, *progressive sliding gear*; ind-c, *individual clutch, constant-mesh*; **plan,** *planetary*; fric, *friction*; elec, *electric*. **Gearset Location,** amid, *amidships*; unit-m, *unit with motor*; unit-j, *unit with jackshaft*; unit-x, *unit with axle*. **Final Drive,** int-g, *internal-gear*; worm, *top worm*; dbl chn, *double side chains*; sp-bevel, *spiral bevel*; db-red, *double-reduction, bevel and spur gears*; ext-g, *external-gear*; -f, *to front wheels*; -4, *on all four wheels*. **Propulsion Taken By,** rad-rd, *radius rods*; tor-t, *torsion-tube*; sub-f, *sub-frame*; spg's, *springs*. **Torque Taken By,** rad-rd, *radius rods*; tor-t, *torsion-tube*; t-arm, *torque-arm*; sub-f, *sub-frame*; sp'gs, *springs*. **Brakes, Type,** ext, ex, *external contracting*; int, *internal expanding*. **Brake Location,** -r-w, *rear wheel*: -sht, *shaft*; -f-w, *front wheel*; -j-s, *jackshaft*; -4-w, *on all four wheels*. **Control, Levers,** cent, *center*; c & r, *gearsh.ft center, brake right*; c & l, *gear shift center, brake left*.

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Technical Specifications of Gasoline

Name and Model	Capacity in Pounds	Price of Chassis	Wheelbase in Inches	FRAME		TIRES			Wheels	MOTOR							IGNITION		
				Material	Construction	Kind	SIZES IN INCHES			No. of Crankshaft Bearings	Bore and Stroke	N.A.C.C. Hp.	Cylinders Cast	Valves Placed	COOLING		Typ	Make	Spark Advance
							Front	Rear							Water Circulation	Radiator Core and Case			
Royal	10,000		168*	rolled-c.		solid	36x6	40x6d	wood-ov.	3	4-4½x5½	36.15	pairs	opp	cent	cell-cast	sing	Bosch	fixed
Royal	12,000		158*	rolled-c.		solid	36x6	40x6d	wood-ov.	3	4-5½*x6*	42.20*	pairs	opp	cent	cell-cast	sing	Bosch	fixed
Royal	14,000		158*	rolled-c.		solid	36x7	40x7d	wood-ov.	3	4-5½x7	44.20	pairs	opp	cent	cell-cast	sing	Bosch	fixed
Rush D	1,000	$ 695	105	pr-steel	flexible	pneu	31x4	31x4	wood-ov.	2	4-3½x5	16.92	block	right	thermo	fin-cast	sing	Conn	hand
Sanford O	2,000	1,290	120	pr-steel	flexible	pneu*	34x4½*	35x5*	wood-sq	3	4-3½x5½	19.61	block	right	thermo	fin-cast	sing	Dixie	fixed
Sanford R	3,000	1,370	138	pr-steel	semi-flx	solid*	36x3½*	36x4*	wood-sq	3	4-3½x5½	19.61	block	right	thermo	fin-cast	sing	Dixie	fixed
Sanford S	4,000	2,100	150*	rolled-c.	flexible	solid	36x4	36x7	wood-sq	3	4-4½x5½	29.00	block	right	cent	fin-cast	sing	Dixie	fixed
Saurer L	10,000	4,800	153½	pr-steel	semi-flx	solid	36x5	42x5d	wood-sq	3	4-4½x5½	34.28	pairs	opp	cent	cell-sheet	sing	Bosch	hand
Saurer M	13,000	5,800	156½	pr-steel	semi-flx	solid	36x5	42x6d	wood-sq	3	4-4½x5½	34.28	pairs	opp	cent	cell-sheet	sing	Bosch	hand
Schleicher	6,000	3,500	150*	rolled-c.	rigid	solid	34x4½	34x3½d	wood-ov.	3	4-4½x5½	29.00	pairs	right	cent	sq-t-sheet	dual-d	Bosch	hand
Schleicher	10,000	4,500	150*	rolled-c.	rigid	solid	34x5	34x4d	wood-ov.	3	4-5x6	40.00	pairs	right	cent	sq-t-sheet	dual-d	Bosch	hand
Selden G	1,500	985	110	pr-steel	semi-flx	pneu	32x3½	33x4	wood-sq	2	4-3½x4½	15.64	block	right	thermo	sq-t-sheet	sing	Dixie	fixed
Selden TL	2,000	1,700	126½	pr-steel	semi-flx	solid	34x3	34x4	wood-sq	3	4-3½x5	19.61	block	right	thermo	sq-t-sheet	sing	Bosch	fixed
Selden JC	4,000	2,000	150	pr-steel	semi-flx	solid	36x4	36x6	wood-sq	3	4-3½x5½	22.50	block	left	cent	sq-t-sheet	sing	Bosch	fixed
Selden JWW	4,000	2,250	150	pr-steel	semi-flx	solid	36x4	36x6	wood-sq	3	4-4½x5½	27.20	block	left	cent	sq-t-sheet	sing	Bosch	fixed
Selden N	7,000	2,950	164	pr-steel	semi-flx	solid	36x5	36x5d	wood-sq	3	4-4½x5½	32.40	pairs	left	cent	sq-t-cast	sing	Eisemann	hand
Service 120	2,000	1,375	135	pr-steel	flexible	solid*	34x3*	34x4*	wood-sq	3	4-3½x5½	19.61	block	right	thermo	fin-cast	sing	Bosch	hand
Service 130	3,000	1,950	150	pr-steel		solid	36x3½	35x5	wood-sq	3	4-4½x5½	27.20	block	right	cent	fin-cast	sing	Eisemann	hand
Service 140	4,000	2,250	160*	pr-steel	rigid	solid	36x4	36x7	wood-sq	3	4-4½x5½	27.20	block	right	cent	fin-cast	sing	Eisemann	hand
Service 170	7,000	3,000	170*	pr-steel	rigid	solid	36x5	36x5d	wood-sq	3	4-4½x5½	29.00	block	right	cent	fin-cast	sing	Eisemann	hand
Service 175	7,000	3,250	170*	pr-steel	rigid	solid	36x5	36x5d	wood-sq	3	4-4½x6	32.40	block	right	cent	fin-cast	sing	Eisemann	hand
Service 200	10,000	4,000	170*	pr-steel	rigid	solid	36x6	40x6d	wood-sq	3	4-4½x6	32.40	block	right	cent	fin-cast	sing	Eisemann	hand
Signal F	2,000	1,550	144*	pr-steel	semi-flx	solid	34x3	36x4	wood-sq	3	4-3½x5½	22.50	block	left	cent	fin-cast	sing	Eisemann	fixed
Signal H	3,000	1,800	144*	pr-steel	semi-flx	solid	34x3½	36x5	wood-sq	3	4-4½x5½	27.20	block	left	cent	fin-cast	sing	Eisemann	fixed
Signal J	4,000	2,100	150*	pr-steel	semi-flx	solid	34x4	36x4d	wood-sq	3	4-4½x5½	27.20	block	left	cent	fin-cast	sing	Eisemann	fixed
Signal M	7,000	3,000	168	pr-steel	semi-flx	solid	36x5	40x5d	wood-sq	3	4-4½x5½	32.40	pairs	left	cent	fin-cast	sing	Eisemann	fixed
Signal R	10,000	4,000	180	pr-steel	semi-flx	solid	36x6	40x6d	wood-sq	3	4-4½x5½	32.40	pairs	left	cent	fin-cast	sing	Eisemann	fixed
Standard 70	4,000	2,000	140			solid	36x4	36x6		3	4-4½x5½	27.20	block	left	cent	fin-sheet	sing	Eisemann	auto
Standard 60	7,000	2,850	144*			solid	36x5	36x5d		3	4-4½x5½	32.40	pairs	left	cent	fin-sheet	sing	Eisemann	auto
Standard 40	8,000	3,025	144*			solid	36x5	36x5d		3	4-4½x5½	32.40	pairs	left	cent	fin-sheet	sing	Eisemann	auto
Standard 50	10,000	3,400	144*			solid	36x5	40x6d		3	4-4½x5½	29.00	pairs	left	cent	fin-sheet	sing	Eisemann	auto
Steele C	4,000	2,250	115*	rolled-c.	semi-flx	solid	38x5	40x4d	cast-cr.	3	4-4½x5½	27.20	block	right	cent	cell-sheet	sing	At Kent	auto
Steele B	6,000	3,000	127*	rolled-c.	semi-flx	solid	38x6	40x5d	cast-cr.	3	4-5x5	40.00	pairs	head	cent	cell-sheet	sing	At Kent	auto
Steele BA	8,000	3,500	127*	rolled-c.	semi-flx	solid	38x6	40x5d	cast-cr.	3	4-5x5	40.00	pairs	head	cent	cell-sheet	sing	At Kent	auto
Steele A	10,000	4,000	127*	rolled-c.	semi-flx	solid	38x7	40x6d	cast-cr.	3	4-5x5	40.00	pairs	head	cent	cell-sheet	sing	At Kent	auto
Sterling	5,000	2,800	156*	pr-steel	rigid	solid	36x4	36x4d*	wood-sq	3	4-4½x5½	29.00	pairs	right	cent	fin-cast	sing	Eisemann	auto
Sterling	7,000	3,400	158*	pr-steel	rigid	solid	36x5	36x5d	wood-sq	3	4-4½x5½	29.00	pairs	right	cent	fin-cast	sing	Eisemann	auto
Sterling	10,000	4,500	168	pr-steel		solid	36x5	40x6d	wood-sq	3	4-4½x6½	36.15	pairs	right	cent	fin-cast	dual	Eisemann	auto
Sterling	14,000	4,750	168	pr-steel		solid	36x6	40x7d	wood-sq	3	4-4½x6½	36.15	pairs	opp	cent	fin-cast	dual	Eisemann	auto
Stewart 5	1,000	695	106	pr-steel	semi-flx	pneu	32x4	32x4	wood-ov.	2	4-3x4½	14.40	block	l & h	thermo	fin-sheet	sing	Dixie	fixed
Stewart 3	1,500	1,290	118	pr-steel	semi-flx	pneu	34x4½	34x4½	wood-ov	3	4-3½x5½	19.61	block	right	thermo	fin-sheet	sing	Dixie	fixed
Stewart 4	2,500	1,390	128	pr-steel	semi-flx	solid	35x3	35x4	wood-sq	3	4-3½x5½	19.61	block	right	thermo	fin-sheet	sing	Dixie	fixed
Studebaker SF	1,000	785	112	pr-steel	rigid	pneu	34x4	34x4	wood-ov	3	4-3½x5	24.22	block	left	cent	fin-sheet	sing	Remy	hand
Studebaker 7	2,000	1,100	125	pr-steel	rigid	pneu	35x5	35x5	wood-ov.	3	4-3½x5	24.22	block	left	cent	fin-sheet	sing	Remy	hand
Sullivan G	3,000	1,650	129	rolled-c.	semi-flx	solid	36x3	36x4	wood-sq	2	4-3½x4½	22.50	block	right	thermo	fin-sheet	sing	Bosch	fixed
Sullivan E	4,000	2,250	150	pr-steel	semi-flx	solid	36x4	36x6	wood-sq	3	4-4½x5½	27.20	block	right	cent	fin-sheet	sing	Bosch	fixed
Superior A	2,000	1,350	124*	pr-steel		solid	34x3½	34x4	wood-sq	3	4-3½x5	19.61	block	head	thermo	sq-t-sheet	sing	Eisemann	fixed
Superior C	4,000	1,800	144	pr-steel		solid	36x4	36x6	wood-sq	3	4-3½x5	22.50	block	head	gear	sq-t-sheet	sing	Eisemann	fixed
Thomas 40	5,000	2,700	150*	pr-steel	semi-flx	solid	34x4	34x4d	wood-sq	3	4-4½x5½	27.20	block	left	cent	cell-sheet	sing	Bosch	fixed
Tiffin A	1,500	1,190	110	pr-steel	flexible	pneu*	35x4½*	35x4½*	wood-ov.	2	4-3½x5	19.61	block	right	thermo	fin-sheet	sing	Bosch	hand
Tiffin AW	2,000	1,450	112	pr-steel	flexible	solid	34x3	34x4	wood-sq	2	4-3½x5	19.61	block	right	thermo	fin-sheet	sing	Bosch	hand
Tiffin GW	3,000	1,790	135	pr-steel	flexible	solid	36x3½	36x5	wood-sq	3	4-3½x5½	22.50	block	left	cent	fin-sheet	sing	Bosch	hand
Tiffin MC	5,000	2,360	140	pr-steel	semi-flx	solid	36x4	36x3½d	wood-sq	3	4-4½x5½	27.20	block	left	cent	fin-sheet	sing	Bosch	hand
Tiffin MW	5,000	2,500	140	pr-steel	semi-flx	solid	36x4	36x3½d	wood-sq	3	4-4½x5½	27.20	block	left	cent	fin-sheet	sing	Bosch	hand
Tiffin RW	10,000	4,250	168	rolled-I	semi-flx	solid	36x5	40x5d	wood-sq	3	6-3½x5½	33.75	threes	right	cent	fin-sheet	sing	Bosch	hand
Tiffin SW	12,000	4,550	168	rolled-I	semi-flx	solid	36x6	40x6d	wood-sq	3	6-3½x5½	33.75	threes	right	cent	fin-sheet	sing	Bosch	hand
Transport Tractor T	10,000	2,500	80	rolled-c.	rigid	solid	34x3½	34x4d	wood-ov.	3	4-3½x5½	19.61	block	right	thermo	cell-sheet	sing	Bosch	fixed
Union B	5,000	1,875	150	pr-steel	flexible	solid	39x4	39x6	wood-sq	4	4-4x6	25.60	block	left	cent	fin-cast	sing	Eisemann	hand
United BSW	4,000	2,250	144*	rolled-c.	rigid	solid	36x4	36x4d	wood-sq	3	4-4½x5½	27.20	block	left	cent	cell-cast	sing	Eisemann	hand
United CSW	7,000	2,900	144*	rolled-c.	rigid	solid	36x5	36x5d	wood-sq	3	4-4½x5½	32.40	pairs	left	cent	cell-cast	sing	Eisemann	hand
United DSW	8,000	3,300	144*	rolled-c.	rigid	solid	36x5	36x6d	wood-sq	3	4-4½x5½	36.15	pairs	opp	cent	cell-cast	sing	Eisemann	hand
United ESW	10,000	3,900	144*	rolled-c.	rigid	solid	36x6	40x6d	cast-cr.	3	4-5 1/16x5½	41.62	pairs	opp	cent	fin-cast	sing	Eisemann	hand
U. S E	4,000	2,200	132*	rolled-c.	semi-flx	solid	34x3½	36x3½d	wood-sq	3	4-4½x5½	27.20	block	left	cent	sq-t-sheet	dual	Bosch	hand
U. S H	4,000	2,500	144*	rolled-c.	semi-flx	solid	34x4	36x4d	wood-sq	3	4-4½x5½	27.20	block	left	cent	sq-t-sheet	dual	Bosch	hand
U. S D	6,000	2,700	144*	rolled-c.	semi-flx	solid	34x5	36x5d	wood-sq	3	4-4½x5½	32.40	pairs	left	cent	sq-t-sheet	dual	Bosch	hand
U. S J	7,000	3,150	156*	rolled-c.	semi-flx	solid	36x5	40x5d	wood-sq	3	4-4½x5½	32.40	pairs	left	cent	sq-t-sheet	dual	Bosch	hand
U. S K	10,000	4,000	168*	rolled-c.	semi-flx	solid	36x6	40x6d	wood-sq	3	4-4½x6½	36.15	pairs	left	cent	sq-t-sheet	dual	Bosch	hand
Universal G	3,000	1,950	133*	rolled-c.	rigid	solid	34x3½	34x5	wood-ov.	2	4-3½x5½	22.50	block	right	thermo	fin-cast	dual	Eisemann	
Universal D	4,000	2,800	132*	rolled-c.	rigid	solid	36x4	36x4d	wood-ov.	3	4-4x5½	25.60	pairs	opp	cent	cell-sheet	dual	Eisemann	
Universal A	6,000	3,400	132*	rolled-I	rigid	solid	36x5	36x5d	wood-ov.	3	4-4x5½	25.60	pairs	opp	cent	cell-sheet	dual	Eisemann	hand
Velie 25	4,000	2,250	150*	pr-steel	flexible	solid	36x4	36x3½d	wood-sq	3	4-4½x5½	27.20	block	left	cent	fin-cast	sing	Bosch	hand
Velie 26	7,000	3,350	172*	pr-steel	flexible	solid	36x5	40x5d	wood-sq	3	4-4½x5½	32.40	pairs	left	cent	fin-cast	sing	Bosch	hand

ABBREVIATIONS: General, *, *with other options;* opt, *optional;* **Price,** -c, *complete with body.* **Frame, Material,** pr-steel, *pressed steel;* rolled-c, *rolled steel, channel section;* rolled-I, *rolled steel, I section;* **Frame Construction,** semi-flx, *semi flexible.* **Tires, kind,** Pneu, *pneumatic;* cush, *cushion,* p & s, *pneumatic front, solid, rear;* s & st, *solid rubber front, steel in rear.* **Tire Sizes,** -d, *dual.* **Wheels,** pr-steel, *pressed steel;* -ov, *oval spokes;* -sq, *square spokes;* -d, *disk or web type;* -hol, *hollow spokes;* -cr, *cruciform spokes;* -x, *cross-shaped solid spokes.* **Cylinders cast,** sing, *singly or individually.* **Location of valves,** opp, *opposite, T-head motor;* r & h, *one valve at right, the other in head, L-head motor;* l & h, *one valve at left the other in head, L-head motor.* **Water circulation,** cent, *centrifugal pump;* thermo-, *thermo-syphon or natural circulation;* gear, *gear pump.* **Radiator Type,** fin, *individually finned tubes;* sq-t, *square-tubular, resembling cellular, sometimes known as flat-tubular;* z-z-t, *zig-zag tubular, resembling cellular,* cell, *cellular or honeycomb type;* tube, *plain tubes without fins;* ring, *tubes arranged in ring about blower fan.* **Radiator Case,** -sheet, *sheet metal;* -cast, *cast metal, built up.* **Ignition Type,** sing, *single;* doub, *double,* dual-d, *dual-double.* **Make of Magneto** (or other sparking device), Conn., *Connecticut;* storage, *storage battery;* Westghs, *Westinghouse;* G & D, *Gray & Davis;* At Kent, *Atwater Kent.* **Spark Advance,** auto, *automatic;* 2-pt-fix, *two-point fixed, battery circuit in retard, magneto in advance.* **Electric System Type,** s, l & i, *starting, lighting and ignition, combination unit;* s & l, *starting and lighting, combination unit;* s & l-2, *starting and lighting, two-unit;* l & i, *lighting and ignition, combination unit.* **Electric System, Make,** Splitdf, *Splitdorf;* Al-Chal,—**(Abbreviations Continued on Opposite Page.)**

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Commercial Vehicles for 1917—Continued

MOTOR										TRANSMISSION							BRAKES		CONTROL		
ELECTRIC SYSTEM			GOVERNOR			SPEED		FUEL SYSTEM			GEARSET			Total Gear Reduction in High	Final Drive	Propulsion Taken By	Torque Taken By					Name and Model
Type	Make	Extra Cost	Type	Drive	Make	Motor in r. p. m.	Truck in m. p. h.	Carbureter Make	Fuel Feed	Tank Location	Clutch Type	Type	Location	Sp'ds				Hand	Foot	Steer	Levers	
starting	.....	stock	suct	motor	Mon'rch	900*	10*	Master	grav	seat	wet-d	ind-c	amid	3	.....	worm	springs	springs	int-r-w	int-r-w	right	right	Royal
.....	.....	.....	suct	motor	Mon'rch	900*	10*	Master	grav	seat	wet-d	ind-c	amid	3	.....	worm*	sp'gs*	sp'gs*	int-r-w	int-r-w	right	right	Royal
.....	.....	.....	suct	motor	Mon'rch	900*	10*	Master	grav	seat	wet-d	ind-c	amid	3	.....	dbl chn	rad-rd	.....	int-r-w	int-r-w	right	right	Royal
s & l-2	Spltdorf	stock	.....	.....	.....	1,600	29	Carter	grav	seat	dry-d	selec	unit-m	3	4.42-1	bevel	springs	springs	int-r-w	ext-r-w	left	cent	Rush D
.....	.....	.....	.....	.....	.....	1,100	16	Scheb	grav	seat	dry-d	selec	unit-m	3	7.00-1	int-g	springs	springs	int-r-w	int-r-w	left	cent	Sanford O
.....	.....	.....	cent	motor	Pierce	1,150	14	.....	grav	seat	dry-d	selec	unit-m	3	8.99-1	dbl chn	rad-rd	.....	int-r-w	ext-r-w	left	cent	Sanford R
.....	.....	.....	.....	.....	.....	1,175	14	Scheb	grav	.....	dry-d	selec	unit-m	3	9.00-1	int-g	springs	springs	int-r-w	ext-r-w	left	cent	Sanford S
none	.....	.....	cent	motor	own	1,000	8*	own	pres	rear	cone	selec	unit-j	4	15.85-1*	dbl chn	rad-rd	.....	int-r-w	ext-sht	right	right	Saurer L
none	.....	.....	cent	motor	own	1,000	9½*	own	pres	rear	cone	selec	unit-j	4	14.80-1*	dbl chn	rad-rd	.....	int-r-w	.....	right	right	Saurer M
none	.....	.....	.....	.....	opt	1,200	25	Stmbg	grav	seat	.....	.....	.....	.....	.....	dbl chn	rad-rd	.....	ext-r-w	ext-sht	right	right	Schleicher
none	.....	.....	.....	.....	.....	1,200	20	Stmbg	grav	seat	cone	selec	amid	4	5.00-1	dbl chn	rad-rd	.....	ext-r-w	ext-sht	right	right	Schleicher
s & l	N-East	80.00	cent	motor	Milwkee	1,200	20	Scheb	grav	seat	dry-d	selec	unit-m	3	6.20-1	worm	springs	springs	int-r-w	int-r-w	right	cent	Selden G
s & l-2*	N-East	175.00	cent	motor	Pierce	1,135	17	Stmbg	grav	seat	dry-d	selec	unit-m	3	6.75-1	worm	springs	springs	int-r-w	int-r-w	right	cent	Selden TL
s & l-2*	N-East	150.00	cent	motor	Pierce	1,295	14¾	Stmbg	grav	seat	dry-d	selec	unit-m	3	9.45-1	int-g	springs	springs	int-r-w	ext-r-w	left*	cent	Selden JC
s & l*	N-East	.....	cent	motor	Pierce	1,295	15	Stmbg	grav	seat	dry-d	selec	unit-m	3	9.25-1	worm	springs	springs	int-r-w	ext-r-w	left*	cent	Selden JWW
s & l-2*	N-East	175.00	cent	motor	Pierce	1,250	13	Stmbg	grav	seat	dry-d	selec	unit-m	4	10.33-1	worm	rad-rd	springs	int-r-w	int-r-w	right	cent	Selden N
s & l-2*	Westghs	160.00*	cent	d-shaft	Pierce	1,200	18	Stmbg	vac	seat	dry-d	selec	unit-m	3	7.00-1	worm	springs	springs	int-r-w	int-r-w	left	cent	Service 120
s & l-2*	Westghs	200.00*	cent	d-shaft	Pierce	1,090	14	Stmbg	vac	.....	dry-p	selec	unit-m	3	7.75-1	worm	springs	springs	int-r-w	int-r-w	left	cent	Service 130
s & l-2*	Westghs	200.00*	cent	d-shaft	Pierce	1,090	14	Stmbg	vac	.....	dry-p	selec	unit-m	3	7.75-1	worm	springs	springs	int-r-w	int-r-w	left	cent	Service 140
s & l-2*	Westghs	200.00*	cent	d-shaft	Pierce	1,090	12	Stmbg	vac	seat	dry-p	selec	unit-m	4	8.75-1	worm	rad-rd	springs	int-r-w	int-r-w	left	cent	Service 170
s & l-2*	Westghs	200.00*	cent	d-shaft	Pierce	1,000	14	Stmbg	vac	seat	dry-p	selec	unit-m	4	8.75-1	worm	rad-rd	springs	int-r-w	int-r-w	left	cent	Service 175
s & l-2*	Westghs	200.00*	cent	d-shaft	Pierce	1,000	10	Stmbg	vac	seat	dry-p	selec	unit-m	4	8.75-1	worm	rad-rd	springs	int-r-w	int-r-w	left	cent	Service 200
.....	.....	.....	suct	motor	Mon'rch	1,100	15	Stmbg	grav	seat	dry-d	selec	unit-m	3	7.75-1	worm	springs	springs	int-r-w	int-r-w	left	cent	Signal F
.....	.....	.....	suct	motor	Mon'rch	1,200	15	Stmbg	grav	seat	dry-d	selec	unit-m	3	8.50-1	worm	rad-rd	springs	int-r-w	int-r-w	left	cent	Signal H
.....	.....	.....	suct	motor	Mon'rch	1,300	15	Stmbg	grav	seat	dry-d	selec	unit-m	3	9.25-1	worm	rad-rd	springs	int	int	left	cent	Signal J
.....	.....	.....	suct	motor	Mon'rch	1,300	15	Stmbg	grav	seat	dry-d	selec	unit-m	3	10.33-1	worm	rad-rd	springs	int-r-w	int-r-w	left	cent	Signal M
.....	.....	.....	suct	motor	Mon'rch	1,700	15	Stmbg	grav	seat	dry-d	selec	amid	4	13.66-1	worm	rad-rd	springs	int-r-w	int-r-w	left	cent	Signal R
.....	.....	.....	suct	motor	Mon'rch	1,100	15	Scheb	.....	.....	cone	selec	amid	3	7.75-1	worm	rad-rd	.....	.....	.....	left	cent	Standard 70
.....	.....	.....	suct	motor	Mon'rch	1,050	12	Stmbg	.....	.....	dry-d	selec	unit-m	3	10.33-1	worm	rad-rd	.....	.....	.....	left	cent	Standard 60
.....	.....	.....	suct	motor	Mon'rch	1,050	12	Stmbg	.....	.....	dry-d	selec	unit-m	3	9.50-1	dbl chn	rad-rd	.....	.....	.....	left	cent	Standard 40
.....	.....	.....	suct	motor	Mon'rch	1,050	9	Stmbg	.....	.....	dry-d	selec	unit-m	3	13.00-1	worm	rad-rd	.....	.....	.....	left	cent	Standard 50
lighting	Carlton	stock	cent	motor	own	1,150	14½	Stmbg	.....	seat	wet-d	ind-c	unit-j	3	9.52-1	dbl chn	rad-rd	.....	int	ext	right	right	Steele C
lighting	Carlton	stock	cent	motor	own	950	11	Stmbg	grav	seat	wet-d	ind-c	unit-j	3	9.21-1	dbl chn	rad-rd	.....	int	ext	right	right	Steele B
lighting	Carlton	stock	cent	motor	own	950	11	Stmbg	grav	seat	wet-d	ind-c	unit-j	3	9.21-1	dbl chn	rad-rd	.....	int-r-w	ext-j-s	right	right	Steele BA
lighting	Carlton	stock	cent	motor	own	950	9	Stmbg	grav	seat	wet-d	ind-c	unit-j	3	9.58-1	dbl chn	rad-rd	.....	int-r-w	ext-j-s	right	right	Steele A
lighting	.....	35.00	cent	motor	Wauk'a	1,040	14½	Holley	grav	seat	dry-d	selec	unit-m	3	7.70-1	worm	springs	springs	int-r-w	int	left	cent	Sterling
lighting	.....	35.00	cent	motor	Wauk'a	1,040	13	.....	grav	.....	dry-d	selec	unit-m	3	8.75-1	worm	springs	springs	int-r-w	int-r-w	left	cent	Sterling
lighting	.....	35.00	cent	motor	Wauk'a	950	12½	Holley	grav	.....	dry-d	selec	amid	4	8.75-1	worm	springs	.....	int	int	left	cent	Sterling
lighting	.....	35.00	cent	motor	Wauk'a	950	10	.....	grav	.....	dry-d	selec	amid	4	11.67-1	dbl chn	rad-rd	.....	ext-sht	int-r-w	left	cent	Sterling
none	.....	.....	.....	.....	none	2,200	35	Zenith	grav	seat	dry-p	selec	unit-m	3	6.00-1	int-g	springs	springs	ext-r-w	ext-r-w	left	cent	Stewart 5
s & l-2	Westghs	125.00	.....	.....	none	2,100	35	Zenith	grav	seat	dry-p	selec	unit-m	3	6.00-1	int-g	springs	springs	int-r-w	ext-r-w	left	cent	Stewart 3
s & l-2	Westghs	125.00	.....	.....	none	2,100	30	Zenith	grav	seat	dry-p	selec	unit-m	3	7.00-1	int-g	springs	springs	int-r-w	ext-r-w	left	cent	Stewart 4
s & l-2	Wagner	stock	cent	f-wheel	Pierce	925	20	Scheb	vac	rear	cone	selec	unit-x	3	4.60-1	bevel	rad-rd	t-arm	int-r-w	ext-r-w	left	cent	Studebaker SF
s & l-2	Wagner	stock	cent	f-wheel	Pierce	975	20	Scheb	vac	rear	cone	selec	unit-x	3	5.00-1	bevel	rad-rd	t-arm	int-r-w	ext-r-w	left	cent	Studebaker 7
.....	.....	.....	.....	.....	.....	.....	.....	Holley	grav	seat	cone	selec	unit-j	3	8.50-1	dbl chn	rad-rd	.....	int-r-w	ext	left	cent	Sullivan G
.....	.....	.....	.....	.....	.....	.....	.....	Holley	vac	seat	dry-d	selec	unit-m	3	9.25-1	worm	springs	springs	int-r-w	int-r-w	left	cent	Sullivan E
none	.....	.....	suct	motor	Mon'rch	1,300	15	Stmbg	vac	seat	dry-d	selec	unit-m	3	7.00-1	int-g	springs	springs	int-r-w	ext-r-w	left	cent	Superior A
none	.....	.....	suct	motor	Mon'rch	1,275	15	Stmbg	vac	seat	dry-d	selec	unit-m	3	9.00-1	int-g	rad-rd	springs	int-r-w	ext-r-w	left	cent	Superior C
lighting	Bosch	stock	cent	duplex	Duplex	1,100	14	Bergen	grav	seat	dry-d	selec	unit-m	3	8.50-1	worm	springs	springs	int-r-w	int-r-w	left	cent	Thomas 40
none	.....	.....	.....	.....	none	1,000	15	Scheb	grav	seat	cone	selec	unit-m	3	6.80-1	int-g	springs	springs	int-r-w	ext-r-w	left	cent	Tiffin A
.....	.....	.....	cent	motor	Pierce	1,000	15	Scheb	grav	seat	dry-d	selec	unit-m	3	6.50-1	worm	springs	springs	int-r-w	int-r-w	left	cent	Tiffin AW
.....	.....	.....	cent	motor	Pierce	1,000	13½	Scheb	grav	seat	dry-d	selec	unit-m	3	8.60-1	worm	springs	springs	int-r-w	ext-r-w	left	cent	Tiffin GW
.....	.....	.....	cent	motor	Pierce	1,000	12	Scheb	grav	seat	cone	selec	amid	3	8.80-1	dbl chn	rad-rd	.....	int-r-w	ext-r-w	left	cent	Tiffin MC
.....	.....	.....	cent	motor	Pierce	1,000	12	Scheb	grav	seat	cone	selec	amid	3	7.75-1	worm	springs	springs	int-r-w	int-r-w	left	cent	Tiffin MW
s & l-2	Bosch	stock	cent	motor	Pierce	1,000	10¾	Scheb	grav	seat	dry-p	selec	amid	3	11.70-1	worm	springs	springs	int-r-w	int-r-w	left	cent	Tiffin RW
s & l-2	Bosch	stock	cent	motor	Pierce	1,000	10½	Scheb	grav	seat	dry-p	selec	amid	3	11.70-1	worm	springs	springs	int-r-w	int-r-w	left	cent	Tiffin SW
.....	.....	.....	.....	.....	.....	.....	12	Zenith	grav	.....	dry-d	selec	unit-m	4	.....	worm	springs	springs	int-r-w	int-r-w	left	cent	Transport Tractor T
none	.....	.....	.....	.....	none	.....	.....	Scheb	grav	dash	wet-d	selec	unit-m	3	7.75-1	int-g	springs	springs	int-r-w	ext-r-w	right	cent	Union B
s & l	opt	.....	suct	motor	Mon'rch	1,125	14	Stmbg	grav	seat	dry-d	selec	unit-m	3	8.66-1	worm	springs	springs	int-r-w	int-r-w	left	cent	United BSW
s & l	opt	.....	suct	motor	Mon'rch	980	12	Stmbg	grav	seat	dry-d	selec	unit-m	3	8.75-1	worm	springs	springs	int-r-w	int-r-w	left	cent	United CSW
s & l	opt	.....	suct	motor	Mon'rch	980	12	Stmbg	grav	seat	dry-d	selec	unit-m	3	8.75-1	worm	springs	springs	int-r-w	int-r-w	.....	cent	United DSW
s & l-2*	opt	200.00*	cent	d-shaft	Pierce	987	10	Stmbg*	grav	seat	dry-d	selec	amid	4	11.75-1	worm	springs	springs	int-r-w	int-r-w	right	right	United ESW
.....	.....	.....	cent	motor	Pierce	1,170	15	Stmbg	grav	seat	cone	ind-c	amid	3	8.16-1	dbl chn	rad-rd	.....	int-r-w	ext-r-w	left	cent	U. S E
.....	.....	.....	cent	motor	Pierce	1,190	15	Stmbg	grav	seat	cone	ind-c	amid	3	8.66-1	worm	springs	springs	int-r-w	int-r-w	left	cent	U. S H
.....	.....	.....	cent	motor	Pierce	1,092	14	Stmbg	grav	seat	cone	ind-c	amid	3	8.01-1	dbl chn	rad-rd	.....	int-r-w	ext-r-w	left	cent	U. S D
.....	.....	.....	cent	motor	Pierce	1,092	13	Stmbg	grav	seat	cone	ind-c	amid	3	11.70-1	worm	springs	springs	int-r-w	int-r-w	left	cent	U. S J
.....	.....	.....	cent	motor	Wauk'a	900	12½	Stmbg	grav	seat	cone	ind-c	amid	3	8.75-1	worm	springs	springs	int-r-w	int-r-w	right	cent	U. S K
lighting	.....	stock	l-b	motor	own	1,160	15	Zenith	grav	seat	dry-p	selec	unit-m	3	7.25-1	worm	rad-rd	.....	int	int	left	cent	Universal G
lighting	.....	stock	l-b	motor	own	1,057	12	Heath	grav	seat	dry-d	selec	amid	3	9.16-1	dbl chn	rad-rd	.....	ext	int	right	right	Universal D
lighting	.....	stock	l-b	motor	own	1,057	12	Heath	grav	seat	dry-d	selec	amid	3	10.29-1	dbl chn	rad-rd	.....	ext-sht	int-r-w	right	right	Universal A
starting	Remy	120.00	cent	motor	Pierce	1,008	18	Stmbg	vac	seat	dry-p	selec	amid	4	6.00-1	worm	springs	springs	int-r-w	int-r-w	right	right	Velie 25
none	.....	.....	cent	motor	Pierce	1,215	14	Stmbg	cav	seat	dry-p	selec	amid	4	10.30-1	worm	rad-rd	springs	int	int	right	right	Velie 26

ABBREVIATIONS: (continued).—*Allis-Chalmers*; G & D, *Gray & Davis*; Westghs, *Westinghouse*; N-East, *Northeast*; Huff-S, *Huff-Simms*; Spl-App, *Spitldorf-Apple*. **Governor Type** cent, c't, *centrifugal*; suct, *suction or gas velocity*; l-b, *loose-ball*; hydr, *hydraulic*. **Governor Drive** motor, *from motor*; d-shft, *from driveshaft*; duplex, *from both motor and driveshaft or front wheel*; f-wheel, f-whl, *from front wheel*. **Governor Make** Wauk'a, *Waukesha*; Mon'rch, Mon, *Monarch*; Her-Sp, *Herschell-Spillman*; Milwkee, *Milwaukee*. **Carbureter Make**, Scheb, *Schebler*; Ray, *Rayfield*; Stmbg, *Stromberg*; Shkspr, *Shakespeare*; Flech, *Flechter*; Zen, *Zenith*, Johns, *Johnson*. **Fuel Feed**, grav, *gravity*; vac, *vacuum*; pres, *pressure*. **Tank Location**, seat, *under seat*; dash, *in dash*; rear, *at rear*; r-bd, *on running-board*. **Clutch Type**, dry-d, *dry multiple disk*; dry-p, *dry plate*: wet-d, *multiple-disk in oil*; wet-p, *plate-in-oil*. **Gearset Type**, selec, *selective sliding gear*; prog, *progressive sliding gear*; ind-c, *individual clutch, constant-mesh*; plan, *planetary*; fric, *friction*; elec, *electric*. **Gearset Location**, amid, *amidships*; unit-m, *unit with motor*; unit-j, *unit with jackshaft*; unit-x, *unit with axle*. **Final Drive**, int-g, *internal-gear*; worm, *top worm*; dbl chn, *double side chains*; sp-bevel, *spiral bevel*; db-red, *double-reduction, bevel and spur gears*; ext-g, *external-gear*; -f, *to front wheels*; -4, *on all four wheels*. **Propulsion Taken By**, rad-rd, *radius rods*; tor-t, *torsion-tube*; sub-f, *sub-frame*; spg's, *springs*. **Torque Taken By**, rad-rd, *radius rods*; tor-t, *torsion-tube*; t-arm, *torque-arm*; sub-f, *sub-frame*; sp'gs, *springs*. **Brakes, Type**, ext, ex, *external contracting*; int, *internal expanding*. **Brake Location**, -r-w, *rear wheel*: -sht, *shaft*; -f-w, *front wheel*; -j-s, *jackshaft*; -4-w, *on all four wheels*. **Control, Levers**, cent, *center*; c & r, *gearshift center, brake right*; c & l, *gearshift center, brake left*.

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Technical Specifications of Gasoline

Name and Model	Capacity in Pounds	Price of Chassis	Wheelbase in Inches	FRAME Material	FRAME Construction	TIRES Kind	TIRES SIZES IN INCHES Front	TIRES SIZES IN INCHES Rear	Wheels	MOTOR No. of Crankshaft Bearings	MOTOR Bore and Stroke	MOTOR N.A.C.C. Hp.	MOTOR Cylinders Cast	MOTOR Valves Placed	MOTOR COOLING Water Circulation	MOTOR COOLING Radiator Core and Case	MOTOR IGNITION Type	MOTOR IGNITION Make	MOTOR IGNITION Spark Advance
Walter C	7,000	$4,200	132*	pr-steel	flexible	solid	40x6	40x6	cast-d	3	4-4¼x6	30.65	block	left	cent	fin-cast	sing	Eisemann*	auto
Walter B	15,000	4,750	162*	pr-steel	flexible	solid	36x6	40x6	cast-hol	3	4-4⅝x6	30.65	block	left	cent	fin-t-cast	sing	Eisemann*	fixed
Watson Tractor	10,000	3,600	80	rolled-c	flexible	solid	34x4	36x5d	wood-sq	3	4-4½x5½	32.40	pairs	left	cent	cell-sheet	dual	Bosch	hand
White GBBE	1,500	2,100	133½	pr-steel		pneu	34x4½	34x4½	wood-ov	2	4-3¾x5½	22.50	block	right	cent	cell-sheet	sing	Bosch*	hand
White TBC	3,000	3,000	145½	pr-steel		pneu	36x4½	36x4½d	wood-ov	2	4-3¾x5½	22.50	block	right	cent	cell-sheet	sing	Bosch*	hand
White TAD	6,000	3,700	163	rolled-I	rigid	solid	36x5	40x5d	cast-x	2	4-3¾x5½	22.50	block	right	cent	cell-sheet	sing	Bosch*	hand
White TCD	10,000	4,500	169	rolled-I		solid	36x5	40x6d	cast-x	3	4-4½x6⅜	29.00	block	right	cent	cell-sheet	sing	Bosch*	hand
Wichita A	2,000	1,350	110*	pr-steel	semi-flx	solid	34x3	34x4	wood-sq	2	4-3¼x5	16.92	block	left	thermo	cell-cast	sing	Bosch	hand
Wichita K	2,000	1,650	118*	pr-steel	semi-flx	solid	36x3	36x4	wood-sq	2	4-3¼x5	19.61	block	left	thermo	cell-cast	sing	Bosch	hand
Wichita L	3,000	1,800	118*	pr-steel	semi-flx	solid	36x3	36x5	wood-sq	2	4-3¼x5	19.61	block	left	thermo	cell-cast	sing	Bosch	hand
Wichita B	4,000	2,100	118*	pr-steel	semi-flx	solid	34x3½	34x6	wood-sq	2	4-3¼x5	19.61	block	left	thermo	cell-cast	sing	Bosch	hand
Wichita R	5,000	2,350	144*	pr-steel	semi-flx	solid	36x4	36x7	wood-sq	3	4-3¾x5½	22.50	block	right	cent	cell-cast	sing	Bosch	hand
Wichita O	7,000	3,250	165*	pr-steel	semi-flx	solid	36x5	36x5d	wood-sq	3	4-4½x5⅝	32.40	pairs	left	cent	cell-cast	sing	Bosch	hand
Wichita Q	10,000	3,850	165*	pr-steel	semi-flx	solid	38x6	38x6d	wood-sq	3	4-4½x5⅝	32.40	pairs	left	cent	cell-cast	sing	Bosch	hand
Wilcox S	2,000	1,600	128	pr-steel	rigid	pneu*	35x5*	35x5*	wood-ov	3	4-3¾x5	22.50	block	right	thermo	cell-sheet	sing	Bosch	hand
Wilcox R	3,000	1,800	134	pr-steel	rigid	solid	36x4	36x5	wood-ov	3	4-4¼x5	29.00	pairs	right	cent	cell-sheet	sing	Bosch	hand
Wilcox Q	4,000	2,000	150*	pr-steel	rigid	solid	36x4	36x3½d	wood-ov	3	4-4¼x5	29.00	pairs	right	cent	cell-cast	sing	Bosch	hand
Wilcox P	7,000	2,900	154*	pr-steel	rigid	solid	36x5	36x5d	wood-ov	3	4-4¼x5	29.00	pairs	right	cent	cell-cast	sing	Bosch	hand
Wilson E	4,000	2,350	144	rolled-c	semi-flx	solid	36x4	36x4d	wood-ov	3	4-4¼x5½	27.20	block	left	cent	fin-cast	sing	Eisemann	fixed
Witt Will WD16	2,000	2,000	120	pr-steel	flexible	solid*	36x3*	36x4*	wood-sq	3	4-3¾x5½	22.50	block	left	cent	sq-t-sheet	sing	Eisemann	auto
Witt Will WD16	4,000	2,500	144	pr-steel	flexible	solid	36x3½	36x7	wood-sq	3	4-4¼x5½	27.20	block	left	cent	sq-t-sheet	sing	Eisemann	auto
Wisconsin B	2,500	1,650	136	pr-steel	semi-flx	solid	34x3½	34x4	wood-ov	3	4-3¼x4	19.61	block	right	cent	cell-sheet	sing	Eisemann	hand
Wisconsin C	5,000	2,500	156*	pr-steel	semi-flx	solid	36x4	36x6*	wood-ov	3	4-4x5½	25.60	pairs	right	cent	cell-sheet	sing	Eisemann	hand
W. S 4	5,000	2,975	154	rolled-c	flexible	solid	36x6	36x6	wood-sq	3	4-4½x5½	32.40	pairs		cent	fin-cast	dual	Nat'l	hand
Zeitler & Lamson	3,000	1,850	150*	pr-steel	semi-flx	solid	36x3½	36x5	wood-sq	3	4-4x5	25.60	block	left	cent	cell-cast	doub	Bosch*	hand
Zeitler & Lamson	5,000	2,450	160*	pr-steel	semi-flx	solid	36x4	36x7	wood-sq	4	4-4x6	25.60	block	left	cent	cell-cast	doub	Bosch*	hand
Zeitler & Lamson	7,000	3,150	170*	rolled-c	semi-flx	solid	36x5	40x5d	cast-d	3	4-4½x5½	36.15	pairs	opp	cent	cell-cast	doub	Bosch*	hand
Zeitler & Lamson	10,000	4,150	180*	rolled-c	semi-flx	solid	36x6	40x6d	cast-d	3	4-5 1/16x5½	41.62	pairs	opp	cent	cell-cast	doub	Bosch*	hand

Received Too Late to Classify

Clyde C	3,000	1,000	134	pr-steel		solid*	34x3½*	34x2½d*	wood-sq	3	4-3¾x4½	22.50	block	left	thermo	fin-cast	sing	Eisemann	fixed
Dayton H	4,000	2,650		rolled-c		solid	36x4	36x3½d	wood-ov	3	4-4¼x5	29.00	pairs	opp	gear	sq-t-cast	dual	Bosch	hand
Dayton	7,000	3,400		rolled-c		solid	36x5	36x4d	wood-ov	4	4-4¼x6	29.00	block	left	cent	fin-cast	dual	Bosch	hand
Dayton K	7,000	3,400		rolled-c		solid	36x5	36x4d	wood-ov	3	4-4¾x5½	36.15	pairs	opp	gear	sq-t-cast	dual	Bosch	hand
Dayton M	10,000	4,500		rolled-c		solid	36x6	42x5d	wood-ov	3	4-5½x7	44.20	pairs	opp	cent	sq-t-cast	dual	Bosch	hand
Dayton E	15,000	4,950		rolled-c		solid	36x7	42x6d	wood-ov	3	4-5½x7	44.20	pairs	opp	cent	sq-t-cast	dual	Bosch	hand
Denmo 10	2,500	1,385	124	pr-steel	rigid	p & s*	34x4½*	34x4	wood-sq	3	4-3¾x5	22.50	block		thermo	cell-sheet	sing	Dixie	
Diamond-T J5	2,000	1,485	132	pr-steel		solid	36x3	36x4	wood-ov		4-3½x5	19.61	block	right	thermo	z-z-t-sheet	sing	Bosch	fixed
Diamond-T J4	3,000	2,050	154*	pr-steel		solid	36x3½	36x5	wood-ov		4-3¾x5	22.50	block	right	cent	z-z-t-sheet	sing	Bosch	fixed
Diamond-T J3	4,000	2,200	154*	pr-steel		solid	36x4	36x6	wood-ov	3	4-4 x5½	27.20	block	right	cent	z-z-t-sheet	sing	Bosch	fixed
Diamond-T L	7,000	3,300	170*	pr-steel		solid	36x5	38x5d	wood-ov		4-4½x5½	32.40	pairs	opp	cent	z-z-t-sheet	sing	Bosch	hand
Diamond-T R	10,000	4,200	170*	pr-steel		solid	36x6	40x6d	wood-sq	3	4-4½x5½	32.40	pairs	opp	cent	z-z-t-sheet	sing	Bosch	hand
Duplex D	6,000		130*	pr-steel	flexible	solid	36x6	36x6	wood-sq*	3	4-4½x5	32.40	block	right	cent	fin-sheet	sing	Eisemann*	hand
Geneva 1	1,500		96			solid	34x2	36x2½		2	2-5½x4½	22.10	sing	head	gear	fin-sheet	sing	Simms	fixed
Stegeman	3,000	1,900	150	pr-steel	flexible	solid	34x3½	36x5	wood-sq		6-3½x4½	25.39	block	left	cent	sq-t-sheet	sing	Westghs	auto
Stegeman	5,000	2,500	144*	pr-steel	flexible	solid	34x4	36x4d	wood-sq		6-3½x5½	29.45	block	left	cent	fin-cast	sing	Westghs	auto
Stegeman	7,000	3,000	156	pr-steel	flexible	solid	36x4	40x5d	wood-sq		6-3½x5½	33.75	pairs	left	cent	fin-cast	sing	Westghs	auto
Stegeman	10,000	4,000	170	pr-steel	flexible	solid	36x5	40x6d	wood-sq		6-3½x5½	33.75	pairs	left	cent	fin-cast	sing	Westghs	auto
Vim 20	1,000	635	102	pr-steel		pneu	31x4	31x4		3	4-3x4½	14.40	block	right	thermo	fin-sheet	sing	Dixie	hand

Steam Vehicles

Name and Model	Capacity in Pounds	Price of Chassis	Wheelbase in Inches	FRAME Material	FRAME Construction	TIRES Kind	TIRES SIZES IN INCHES Front	TIRES SIZES IN INCHES Rear	Wheels	BOILER Location	BOILER Type	BOILER Heating Surface in Sq. In.	BOILER Horsepower	BOILER BURNER Type	BOILER BURNER Regulation	BOILER PRESSURE Normal in Lbs.	BOILER PRESSURE Maximum in Lbs.	WATER Water Capacity in Gal.	WATER CONDENSER Type	WATER CONDENSER Circulation
Stanley	1,500	1,550	134	pr-steel	semi-flx	pneu	34x4½	34x4½	wood-ov	under hood	fire-tube	14,976	20	Bunsen	pressure	575	625	24	cell-sheet	natural
Stanley	2,500	2,000	136	pr-steel	semi-flx	pneu	36x5	36x5	wood-ov	under hood	fire-tube	22,752	30	Bunsen	pressure	575	625	50	cell-sheet	natural

ABBREVIATIONS: General, *, *with other options;* opt, *optional;* **Price,** -c, *complete with body.* **Frame, Material,** pr-steel, *pressed steel;* rolled-c, *rolled steel, channel section;* rolled-I, *rolled steel, I section;* **Frame Construction,** semi-flx, *semi flexible.* **Tires, kind,** Pneu, *pneumatic;* cush, *cushion,* p & s, *pneumatic front, solid, rear;* s & st, *solid rubber front, steel in rear.* **Tire Sizes,** -d, *dual.* **Wheels,** pr-steel, *pressed steel;* -ov, *oval spokes;* -sq, *square spokes;* -d, *disk or web type;* -hol, *hollow spokes;* -cr, *cruciform spokes;* -x, *cross-shaped solid spokes.* **Cylinders cast,** sing, *singly or individually.* **Location of valves,** opp, *opposite, T-head motor;* r & h, *one valve at right, the other in head, L-head motor;* l & h, *one valve at left the other in head, L-head motor.* **Water circulation,** cent, *centrifugal pump;* thermo-, *thermo-syphon or natural circulation;* gear, *gear pump.* **Radiator Type,** fin, *individually finned tubes;* sq-t, *square-tubular, resembling cellular, sometimes known as flat-tubular;* s-s-t, *zig-zag tubular, resembling cellular,* cell, *cellular or honeycomb type;* tube, *plain tubes without fins;* ring, *tubes arranged in ring about blower fan.* **Radiator Case,** -sheet, *sheet metal;* -cast, *cast metal, built up.* **Ignition Type,** sing, *single;* doub, *double,* dual-d, *dual-double.* **Make of Magneto** (or other sparking device), Conn., *Connecticut;* storage, *storage battery;* Westghs, *Westinghouse;* G & D, *Gray & Davis;* At Kent, *Atwater Kent.* **Spark Advance,** auto, *automatic;* 2-pt-fix, *two-point fixed, battery circuit in retard, magneto in advance.* **Electric System Type,** s, l & i, *starting, lighting and ignition, combination unit;* s & l, *starting and lighting, combination unit;* s & l-2, *starting and lighting, two-unit;* l & i, *lighting and ignition, combination unit.* **Electric System, Make,** Splitdf, *Splitdorf;* Al-Chal,—**(Abbreviations Continued on Opposite Page.)**

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Commercial Vehicles for 1917—Continued

MOTOR										TRANSMISSION							BRAKES		CONTROL		
ELECTRIC SYSTEM			GOVERNOR			SPEED		FUEL SYSTEM			GEARSET										
Type	Make	Extra Cost	Type	Drive	Make	Motor in r. p. m.	Truck in m. p. h.	Carbureter Make	Fuel Feed	Tank Location	Clutch Type	Type	Location	Sp'ds	Total Gear Reduction in High	Final Drive	Propulsion Taken By	Torque Taken By	Hand	Foot	Steer	Levers	Name and Model
none			cent.	motor	own	1,050	15	H & N.	grav.	seat.	cone.	selec.	unit-m.	4	8.50–1	ext-g-4.	springs.	springs.	ext-sht.	ext-r-w.	left.	cent.	Walter C
none			cent.	motor	own	1,000	15	H & N.	grav.	seat.	cone.	selec.	unit-m.	4	7.85–1	ext-g.	springs.	springs.	ext-sht.	int-r-w.	left.	cent.	Walter B
			cent.	motor	Pierce	1,100	11	Zenith	grav.	seat.	dry-d.	selec.	unit-m.	4	10.30–1	worm	rad-rd.	springs.	int-r-w.	int-r-w.	right.	cent.	Watson Tractor
s & l		extra			none			own	grav.	seat.	wet-p.	selec.	amid.	4		bevel	rad-rd.	springs.	int-r-w.	ext-r-w.	left.	c & l.	White GBBE
s & l		extra			none			own	grav.	seat.	wet-p.	selec.	amid.	4		db-red.	rad-rd.	springs.	int-r-w.	ext-r-w.	left.	c & l.	White TBC
					none			own	grav.	seat.	wet-p.	selec.	amid.	4		dbl chn.	rad-rd.		int-r-w.	ext-j-s.	left.	c & l.	White TAD
					none			own	grav.	seat.	wet-p.	selec.	amid.	4		dbl chn.	rad-rd.		int-r-w.	ext-j-s.	left.	c & l.	White TCD
s & l-2	Westghs.	125.00			none			Stmbg.	grav.	seat.	cone.	selec.	unit-j.	3	7.32–1	dbl chn.	rad-rd.		int-r-w.	int-sht.	right.	cent.	Wichita A
s & l-2	Westghs.	125.00			none			Stmbg.	grav.	seat.	cone.	selec.	amid.	3	7.80–1	worm	springs.	springs.	int-r-w.	int-r-w.	right.	cent.	Wichita K
s & l-2	Westghs.	125.00			none			Stmbg.	grav.	seat.	cone.	selec.	amid.	3	8.66–1	worm-r.	springs.	springs.	ext-r-w.	int-r-w.	right.	cent.	Wichita L
s & l-2	Westghs.	125.00			none			Stmbg.	grav.	seat.	cone.	selec.	unit-j.	3	8.24–1	dbl chn.	rad-rd.		int-r-w.	int-sht.	right.	cent.	Wichita B
s & l-2	Westghs.	125.00	cent.	motor	Wauk'a.	1,060	13	Stmbg.	grav.	seat.	cone.	selec.	amid.	3	8.75–1	worm	springs.	springs.	int-r-w.	int-r-w.	right.	cent.	Wichita R
s & l-2	Westghs.	150.00	cent.	motor	Wauk'a.	1,200	11	Stmbg.	grav.	seat.	cone.	selec.	amid.	3	11.75–1	worm	springs.	springs.	int-r-w.	int-r-w.	right.	cent.	Wichita O
s & l-2	Westghs.	150.00	cent.	motor	Wauk'a.	940	9	Stmbg.	grav.	seat.	cone.	selec.	amid.	3	11.75–1	worm	springs.	springs.	int-r-w.	int-r-w.	right.	cent.	Wichita Q
lighting		stock	cent.	motor	Pierce	1,200	18	Ray*	grav.	seat.	dry-d.	selec.	unit-m.	3	6.50–1	worm	springs.	springs.	int-r-w.	int-r-w	left.	cent.	Wilcox S
lighting		stock	cent.	motor	Pierce	1,100	16	Ray*	grav.	seat.	cone.	selec.	amid.	3	7.70–1	worm	springs.	springs.	int-r-w.	int-r-w.	left.	cent.	Wilcox R
lighting		stock	cent.	motor	Pierce	1,100	14	Ray*	grav.	seat.	cone.	selec.	amid.	3	8.60–1	worm	springs.	springs.	int-r-w.	int-r-w.	left.	cent.	Wilcox Q
lighting		stock	cent.	motor	Pierce	1,100	10	Ray*	grav.	seat.	cone.	selec.	amid.	3	11.70–1	worm	springs.	springs.	int-r-w.	int-r-w.	left.	cent.	Wilcox P
			cent.	motor	Pierce	1,050	15	Marvel	grav.	seat.	cone.	selec.	amid.	3	8.60–1	worm	springs.	springs.	int-r-w.	int-r-w.	left.	cent.	Wilson E
			cent.	motor	Pierce			Zenith	grav.	seat.	dry-d.	selec.	unit-m.	3		worm	springs.	springs.	int-r-w.	int-r-w.	left.	cent.	Witt Will WD16
			cent.	motor	Pierce			Zenith	grav.	seat.	dry-d.	selec.	unit-m.	3		worm	springs.	springs.	int-r-w.	int-r-w.	left.	cent.	Witt Will WD16
			cent.	motor	Wauk'a.	1,200	15	Master	grav.	seat.	dry-d.	selec.	unit-m.	3	7.75–1	worm	springs.	springs.	int-r-w.	int-r-w.	left.	cent.	Wisconsin B
			cent.	motor	Wauk'a.	1,100	14	Master	grav.	seat.	dry-d.	selec.	unit-m.	3	8.75–1	worm	springs.	springs.	int.	int.	left.	cent.	Wisconsin C
								Zenith	grav.	seat.	wet-d.		unit-m.	3		worm-4	springs.	springs.	int.	int.	left.	cent.	W. S 4
l & i*	Vesta	stock	cent.	duplex	Duplex	1,200	16	Stmbg.	vac.	seat.	dry-p.	ind-c.	unit-m.	3	7.75–1	worm	springs.	springs.	int-r-w.	ext-r-w.	left.	cent.	Zeitler & Lamson
l & i*	Vesta	stock	cent.	duplex	Duplex	1,200	14	Stmbg.	vac.	seat.	dry-p.	ind-c	unit-m.	3	8.75–1	worm	springs.	springs.	int-r-w.	int-r-w.	left.	cent.	Zeitler & Lamson
l & i*	Vesta	stock	cent.	duplex	Duplex	1,200	12	Stmbg.	vac.	seat.	dry-p.	ind-c	amid.	3	11.75–1	worm	springs.	springs.	int-r-w.	int-r-w.	left.	cent.	Zeitler & Lamson
l & i*	Vesta	stock	cent.	duplex	Duplex	1,200	10	Stmbg.	vac.	seat.	dry-p.	ind-c.	amid.	3	11.75–1	worm	springs.	springs.	int-r-w.	int-r-w.	left.	cent.	Zeitler & Lamson

Received Too Late to Classify

									grav.	dash.	wet-p.	selec.	unit-m.	3		int-gear	springs.	springs.	int-r.w.	ext-r-w.	left.	cent.	Clyde C
								Stmbg.	grav.	seat.	wet-d.	selec.	unit-j.	3		dbl chn.	rad-rd.		int-r-w.	ext-j-s.	left.	cent.	Dayton H
								Stmbg.	grav.		dry-p.	selec.	amid.	3		worm	rad-rd.	t-arm	int-r-w.	int-r-w.	left.	cent.	Dayton
								Stmbg.	grav.	seat.	wet-d.	selec.	unit-j.	3		dbl chn.	rad-rd.		int-r-w.	ext-j-s.	left.	cent.	Dayton K
								Stmbg.	grav.		wet-d.	selec.	unit-j.	3		dbl chn.	rad-rd.		int-r-w.	ext-j-s.	left.	cent.	Dayton M
								Stmbg.	grav.		wet-d.	selec.	unit-j.	3		dbl chn.	rad-rd.		int-r-w.	ext-j-s.	left.	cent.	Dayton E
s & l-2	Spl-App.	stock	cent.	d-shaft	Pierce		20	Stewart	grav.	seat.	dry-p.	selec.	unit-m.	3		int-g.	springs.	springs.	ext-r-w.	int-r-w.	left.	cent.	Denmo 10
						1,300	18	Ray	grav.	seat.	dry-d.	selec.	unit-m.	3	7.75–1	worm	springs.	springs.	int-r-w.	int-r-w.	left.	cent.	Diamond-T J5
						1,250	16	Ray	grav.	seat.	dry-d.	selec.	unit-m.	3	7.75–1	worm	springs.	springs.	int-r-w.	int-r-w.	left.	cent.	Diamond-T J4
			cent.	motor	Pierce	1,100	15	Ray	grav.	seat.	dry-d.	selec.	unit-m.	3	7.75–1	worm	springs.	springs.	int-r-w.	int-r-w.	right.	cent.	Diamond-T J3
			suct.	motor	Mon'rch.	775	12	Ray	grav.	seat.	dry-d.	selec.	unit-m.	4	6.88–1	worm	rad-rd.	springs.	int-r-w.	int-r-w.	right.	cent.	Diamond-T L
			suct.	motor	Mon'rch.			Ray	grav.		dry-d.	selec.	amid.	4	13.66–1	worm	rad-rd.	springs.	int.	int.	right.	cent.	Diamond-T R
s, l & i		150.00	cent.	duplex	Duplex	940	12	Scheb.	vac.		dry-d.	selec.	unit-m.	6	12.00–1	int-g-4.	rad-rd.	t-arm	ext-sht.	ext-sht.	left.	cent.	Duplex D
							18	Scheb.			dry-p.	plan.	unit-j.	2		dbl chn.	rad-rd.				right.	right.	Geneva 1
s & l-2	Westghs.	stock	cent.	motor	Pierce	1,100	18	Stmbg.	grav.	seat.	dry-d.	selec.	unit-m.	3	7.75–1	worm	springs.	springs.	int-shft.	int-r-w.	left.	c & l.	Stegeman
s & l-2	Westghs.	stock	cent.	motor	Pierce	1,100	15	Stmbg.	grav.	seat.	dry-d.	selec.	unit-m.	3	9.25–1	worm	springs.	springs.	int-shft.	int-r-w.	left.	c & l.	Stegeman
s & l-2	Westghs.	stock	cent.	motor	Pierce	1,100	12	Stmbg.	grav.	seat.	dry-d.	selec.	unit-m.	3	10.33–1	worm	springs.	springs.	int-shft.	int-r-w.	left.	c & l.	Stegeman
s & l-2	Westghs.	stock	cent.	motor	Pierce	1,100	10	Stmbg.	grav.	seat.	dry-d.	selec.	unit-m.	3	11.00–1	worm	springs.	springs.	int-shft.	int-r-w.	left.	c & l.	Stegeman
							25	Zenith			cone.	selec.	unit-m.	3	4.50–1	bevel	springs.	springs.			left.		Vim 20

Steam Vehicles

SYSTEM		ENGINE							TRANSMISSION					CONTROL					
Feed Pump Type	Feed Control	Location	No. of Cylinders	Cylinders Cast	Valve Location	Valve Action	Valve Stroke	Reverses By	Final Drive	Gear-Ratio	Axle Type	Propulsion Taken By	Torque Taken By	Throttle	Hook-up	Reverse	Steering Wheel Location	Brake Lever Location	Name and Model
plunger	by-pass	unit-x	2	block	btw cyls	Stephenson	adj.	links	spur-g.	2 1/3–1	non-fl.	rad-rd.	t-arm	lever	pedal	pedal	left	left	Stanley
plunger	by-pass	unit-x	2	block	btw cyls	Stephenson	adj.	links	spur-g.	2–1	non-fl.	rad-rd.	t-arm	lever	pedal	pedal	left	left	Stanley

ABBREVIATIONS: (continued).—*Allis-Chalmers*; G & D, *Gray & Davis*; Westghs, *Westinghouse*; N-East, *Northeast*; Huff-S, *Huff-Simms*; Spl-App, *Splitdorf-Apple*. **Governor Type** cent, c't, *centrifugal*; suct, *suction or gas velocity*; l-b, *loose-ball*; hydr, *hydraulic*. **Governor Drive** motor, *from motor*; d-shft, *from driveshaft*; duplex, *from both motor and driveshaft or front wheel*; f-wheel, f-whl, *from front wheel*. **Governor Make** Wauk'a, *Waukesha*; Mon'rch, Mon, *Monarch*; Her-Sp, *Herschell-Spillman*; Milwkee, *Milwaukee*. **Carbureter Make,** Scheb, *Schebler*; Ray, *Rayfield*; Stmbg, *Stromberg*; Shkspr, *Shakespeare*; Flech, *Flechter*; Zen, *Zenith*, Johns, *Johnson*. **Fuel Feed,** grav, *gravity*; vac, *vacuum*; pres, *pressure*. **Tank Location,** seat, *under seat*; dash, *in dash*; rear, *at rear*; r-bd, *on running-board*. **Clutch Type,** dry-d, *dry multiple disk*; dry-p, *dry plate*: wet-d, *multiple-disk in oil*; wet-p, *plate-in-oil*. **Gearset Type,** selec, *selective sliding gear*; prog, *progressive sliding gear*; ind-c, *individual clutch, constant-mesh*; plan, *planetary*; fric, *friction*; elec, *electric*. **Gearset Location,** amid, *amidships*; unit-m, *unit with motor*; unit-j, *unit with jackshaft*; unit-x, *unit with axle*. **Final Drive,** int-g, *internal-gear*; worm, *top worm*; dbl chn, *double side chains*; sp-bevel, *spiral bevel*; db-red, *double-reduction, bevel and spur gears*; ext-g, *external-gear*; -f, *to front wheels*; -4, *on all four wheels*. **Propulsion Taken By,** rad-rd, *radius rods*; tor-t, *torsion-tube*; sub-f, *sub-frame*; spg's, *springs*. **Torque Taken By,** rad-rd, *radius rods*; tor-t, *torsion-tube*; t-arm, *torque-arm*; sub-f, *sub-frame*; sp'gs, *springs*. **Brakes, Type,** ext, ex, *external contracting*; int, *internal expanding*. **Brake Location,** -r-w, *rear wheel*: -sht, *shaft*; -f-w, *front wheel*; -j-s, *jackshaft*; -4-w, *on all four wheels*. **Control, Levers,** cent, *center*; c & r, *gearshift center, brake right*; c & l, *gearshift center, brake left*.

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Glossary of Terms Used in Electric Specifications

GROUPED and arranged so that each make occupies a separate group and each model a separate line, specifications of 1917 electric trucks and electric industrial vehicles appear in pages folowing. There are thirty-seven separate chassis of the first class and twenty of the industrials, representing a total of thirteen separate manufacturers. As in the gasoline specifications, each model occupies a line to itself, and there are thirty-four different items of information on each, except where manufacturers have failed to give THE COMMERCIAL VEHICLE official information relative to any of the particular points.

Load Capacity

The load capacity of a motor truck is the maximum amount of load it is intended to carry in regular service, in addition to the weight of the body, the cab and the crew.

Price of Chassis

The chassis price is the list price of the chassis, equipped with a standard seat or cab and all other standard equipment except the body, which is usually either selected from a stock of standard bodies or built to order, being charged for extra. Some makers, however, do not sell chassis not equipped with bodies, as indicated in the table by a small c following the price, representing that the price is for the *complete* vehicle.

Some chassis are not listed with their batteries, as such a wide range of option is given the purchaser on battery equipment that the chassis and the battery are each priced separately. Different batteries sell at widely differing prices, according to make and also according to type and capacity of the same make. Therefore, this year a separate column has been provided for the price without the battery. In cases where a price with the battery is given, this covers only the standard battery shown further on in the table.

Wheelbase

The wheelbase of a truck is the longitudinal distance between centers of the axles, being measured in inches.

Sizes of Tires

Tires are measured by their *diameter* and their *width*. The diameter is the total diameter from tread to tread, not including oversize which some makers give above and beyond the *rated* size. The width is the *base width*, not the *tread*. Tires of equal base width often vary in tread width, owing to different contour. Rubber tires are made in *single* and *dual*, a dual tire being two single tires on one rim. When a tire is specified as a certain size *dual* this represents two tires of that size on one wheel.

Battery Location

There are two principal methods of carrying the battery; the first is that in which the battery is carried under the floor, beneath the frame, so that the space above the frame is clear allowing any type of body to be fitted. A vehicle so made is said to be of the *platform type*, or to carry its battery *amidships*, *underslung*. The other standard battery location is above the frame and partially under the seat, or amidships, over the frame. Other battery locations are at the rear, above the frame; at the rear, below the frame; at the front, above the frame; at the front, below the frame; under a hood; under the seats, and, when divided into two sections, under the hood and amidships, and under the hood and under the seat.

Among industrial trucks practically the same battery locations are used as on street vehicles. One location peculiar to this class is that in which the battery is carried in two sections, one at each end, on top of the frame. This is found in tractors, the battery boxes serving as seats for the operator.

Number of Plates

A storage cell consists of a jar of rubber or similar substance, in a lead battery, or of steel in the Edison make, in which there are a number of plates arranged like the leaves of a book. Half of these are positive and half negative. The capacity of the cell depends upon the surface of these plates, so that the greater the number of plates in a given size of cell, the greater its capacity. *Lead* batteries have plates of a soft, spongy paste of pure lead, alternating with plates pasted with peroxide of lead. The Edison or *alkali* battery uses plates of steel alternating with plates of nickel-hydrate. The lead battery plates are immersed in a sulphuric acid solution, and those of the alkali type, in an alkaline fluid.

Battery, Number of Cells

A storage battery consists of a number of *cells*, as described above. Each cell has a voltage of approximately 2, so that to secure a voltage high enough for the rest of the vehicle, it is not possible to use one large cell with sufficient and large enough plates to give the required amperage, but it is necessary to have a number of cells, for each cell added to the battery increases the voltage by 2.

Battery, Number of Trays

The different cells of a battery are grouped in *trays*, or crates which may be picked up and handled independently of the rest of the battery. Each tray is in reality a small battery, but when wired in connection with other trays, it becomes a part of the whole.

Ampere-hour Capacity

Ampere-hour capacity is the measure of the current in a battery. It represents the amperes of charge that may be held by the battery multiplied by the number of hours, at normal discharge rates, it will require to discharge the battery to the minimum safe limit. Thus, if a battery have a charge of 40 amperes, and discharges in 5 hours, it is said to have 200 ampere-hours capacity.

Mileage Per Charge

The manufacturer's figures are given in this instance, as there is no means of accurately determining this from the ampere-hour capacity or other information given.

Motor Location and Number

Electric vehicles are driven by one or more motors, located in seven different places in the chassis. These are *amidships; unit with the axle, unit with the jackshaft*, to the *rear of the chassis*, in the *front of the chassis*, in the *front wheel* or wheels, and *in the wheels*. When the motor is a unit with the axle it either drives through gears in or on the wheels or by bevel or worm gears direct to the axle. When it is a unit with the wheels or a wheel, it is incorporated with the wheel and inclosed by it, driving by bevel pinions to the bevel-toothed felloe of the wheel.

Motor Winding

In American electric vehicle practice, but one type of winding is employed, the *series* form. Series winding is that in which all of the current is obliged to pass first through the armature and then through the field, the same size of wire being used in both field and armature windings.

Motor Voltage

Motor voltage as given is the rated voltage at which the motor is designed to operate. In general, the voltage of a

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battery at full charge is slightly more than 2 volts per cell, when all cells are wired in series. Thus, a 44-cell battery under full charge will give in excess of 90 volts.

Motor Horsepower

This figure refers to the rated electrical horsepower of the motor.

Controller Location

The controller is the means by which the current is controlled in its passage from the battery to the motor and return. To avoid severe strains from starting too suddenly, it is necessary that the current flow be restricted in starting, this restriction to flow being gradually diminished as the motor takes up its work and the vehicle speed increases. It is also necessary to provide a means of running the vehicle slowly, as in maneuvering and driving in traffic. The controller therefore introduces resistance into the circuit in all but the highest speed, when it transmits the current direct. The locations are various and obviously arranged for convenience in the control lever connections and protection from harm.

Gearing, First Reduction

As a smaller, lighter motor can be used if it is operated at high speeds, to give the same power, high-speed motors have become the rule in electrical vehicle practice. The use of these motors requires a considerable reduction on the final drive to the road wheels, however, especially on the heavier models, and for this reason the drive is usually divided into two parts with a primary and secondary reduction.

The first reduction is by *herringbone* gears, a form of cylindrical gear in which the teeth are V-shaped, and possess the advantage of silence and of having more than one tooth in mesh at a time; by *bevel* gears, direct to the jackshaft, like on a chain-driven gasoline vehicle, by *roller* or *silent chain*, or by direct *spur* gearing. The word *none*, appearing in this column of the specification table means that there is no primary reduction, but that the final reduction is the only one.

Gearing, Second Reduction

The forms of gearing used in the first reduction are also used in the second reduction, with *worm* gearing, *double chains*, and *spiral bevels* in addition.

Torque Taken By

Torque, in a live axle, is the tendency for it to turn backward bodily instead of remaining stationary while the wheels turn forward. For this reason some means must be arranged to keep it from turning. For this purpose *torque arms*, or arms attached at two point vertically to the axle housing and at one point to the frame of the vehicle; *torsion tubes*, or tubes attached rigidly to the axle and surrounding the driving shaft and also attached by a yoke or other means to the frame; *radius rods*, which, when two in number superimposed, each attached to the axle and frame at different points, act both as torque stays and propulsive members; and the vehicle *springs*, which in this case are firmly anchored to the axle and shackled at one end only. They are also usually specially designed to withstand this additional duty.

Total Gear-ratio

By total gear-ratio is meant the total reduction through all gears from the armature shaft of the motor to the road or driving wheels.

Propulsion Taken By

Propulsion is the pushing or pulling action of the driving axle. Without some restraining means the axle would merely move forward under the chassis and tear itself loose instead of moving the vehicle. To fulfill this function *radius rods*, a securely anchored *torque arm*, a *torsion tube*, or the vehicle *springs* are used.

On some makes of industrial trucks which are not provided with springs, the axles are rigidly attached to the frame, and hence no such additional stays are needed.

Special Details of Electric Industrial Trucks

Name and Model	Type	TRACK IN INCHES		Turning Circle in Feet	LOAD PLATFORM SIZE IN INCHES			Overall Length in Inches	Maximum Grade Negotiable in per Cent	Driver's Position	Brake Control	Cut-out Control	Number of Wheels
		Front	Rear		Length	Width	Height from Ground						
Buda....A	warehouse-platform	34½	36	14	84	43	20¾	96		plat-r	pedal	brake	4
Buda....C		30½	34½	12		40¾	11	103					4
Buda....CE	transfer	31	34	12	60	40¾	11	103		plat-r	pedal	brake	4
Buda....TW	tractor		33	7½		40		74			pedal		3
Dynamic....A	warehouse-platform	36	36	12½	84	45	24	102	20	plat-f	pedal	brake	4
Dynamic....B	warehouse-platform	27	27	9½	76	36	24	94	20	plat-f	pedal	brake	4
Electromobile....EJ	tractor	34	34	9½		41	22½	72	30	seat-plat	pedal	brake	4
Elwell-Parker....SA	baggage-platform	39½	39½	24	137	43½	33	149		plat-ends	pedal	pedal	4
Elwell-Parker....SC	baggage-platform	33½	33½	20	108	37½	33	120		plat-ends	pedal	pedal	4
Elwell-Parker....SE	baggage-platform	39½	39½	24	136	43½	33	150		plat-ends	pedal	pedal	4
Elwell-Parker....DD	baggage-drop-plat	39½	39½	24	137	43½	11	149		plat-ends	pedal	pedal	4
Elwell-Parker....DG	baggage-drop-plat	39½	39½	24	137	43½	11	151		plat-ends	pedal	pedal	4
Elwell-Parker....IB	warehouse-platform	25	25	12	72	37	18	81		plat-f	pedal	pedal	4
Elwell-Parker....IB	warehouse-platform	25	25	12	76	46	18	84		plat-f	pedal	pedal	4
Elwell-Parker....ID	warehouse-platform	25	25	15	88	37	18	97		plat-f	pedal	pedal	4
Elwell-Parker....F	warehouse-drop-plat	33½	26	14	57	44	11	85		plat-f	pedal	pedal	4
Elwell-Parker....W	warehouse-drop-plat	33½	26	20	94	37	17	112		plat-f	pedal	pedal	4
Elwell-Parker....F	tractor	33½	26	14	none	none	none	85		plat-f	pedal	pedal	4
Elwell-Parker....I	tractor	25	25	11	none	none	none	74		seat-t	pedal	pedal	4
Elwell-Parker....EB	freight car-low plat	33½	26	14	57	44	11	85		plat-f	pedal	pedal	4
Elwell-Parker....EC	freight car-low plat	33½	26	14				85		plat-f	pedal	pedal	4
Elwell-Parker....E	transfer	33½	26	14	50	44	11	85		plat-f	pedal	pedal	4
Elwell-Parker....	transfer	33½	26	14	60	37	17	93		plat-f	pedal	pedal	4
Elwell-Parker....	transfer	33½	16	14	60	26	11	91		plat-f	pedal	pedal	4
G.V....	warehouse-platform	35	35	15	69	43½	21½	90	10	plat-r	pedal	brake	4
G.V....	warehouse-platform	35	35	23	123	43½	22½	144	10	plat-r	pedal	brake	4
Hunt....	baggage-platform	40	40	18	90	48	23½	108		plat-f	pedal		4
Mercury....Z	tractor		30½	9½	none	none	none	71¼		seat-f	pedal	brake	3
Mercury....X	tractor	30¾	31½	11½	none	none	none	74½		seat-f	pedal	brake	4
Mercury....U	tractor	37½	47	17	none	none	none	104		seat-f	pedal		4

ABBREVIATIONS: General, *, *with other options.* **Type,** drop-plat, *drop-platform;* low-plat, *low platform.* **Driver's Position,** plat-r, *platform at rear;* plat-f, *platform at front;* plat-ends, *platform at both ends;* seats-ends, *seats at both ends;* seat-f, *seat in front.* **Brake Control,** plat, *hinged platform;* †, *secondary brake control by lever or hinged seat.* **Cut-out Control,** plat, *by hinged platform.*

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Technical Specifications of 37 Electric The American Market

Seven Electric Industrial Trucks

Name and Model	Load Capacity in Pounds	PRICE OF CHASSIS: With Battery	PRICE OF CHASSIS: Without Battery	Wheelbase in Inches	TIRES: Kind	TIRES: SIZES IN INCHES: Front	TIRES: SIZES IN INCHES: Rear	BATTERY: Location	BATTERY: Make and Type	BATTERY: No. Plates	BATTERY: No. Cells	BATTERY: No. Trays	BATTERY: Amp.-Hr. Capacity	BATTERY: MILES PER CHARGE: Light	BATTERY: MILES PER CHARGE: Loaded	MOTOR: Location and Number	MOTOR: Make
Atlantic 1-C	2,000			103	solid	34x3½	36x4	amid-u	optional							amid-1	G.E.
Atlantic 2-C	4,000			115½	solid	34x4	36x3d	amid-u	optional							amid-1	G.E.
Atlantic 3-C	7,000			135	solid	36x5	40x4d	amid-u	optional							amid-1	G.E.
Atlantic 5-C	10,000			144	solid	36x6	40x5d	amid-u	optional							amid-1	G.E.
C.T	1,000	1,925*	1,500	90	solid	36x3	36x3	amid-u	Philadelphia*	13*	42*		153*		60*†	unit-x-2	G.E.
C.T	2,000	2,330*	1,800	100	solid	36x3½	36x4	amid-u	Philadelphia*	17*	42*	5*	204*		60*†	unit-x-2	G.E.
C.T	4,000	2,850*	2,200	116	solid	36x5	36x3½d	amid-u	Philadelphia*	21*	42*	6*	225*		60*†	unit-x-2	G.E.
C.T	7,000	3,910*	3,100	115	solid	36x3½d	36x4d	amid-u	Philadelphia*	27*	42*	6*	331*		50*†	unit-x-4	G.E.
C.T	10,000	4,425*	3,500	132	solid	36x4d	36x5d	amid-u	Philadelphia*	31*	42*	9*	382*		50*†	unit-x-4	G.E.
Couple-Gear H	7,000	4,200	3,500	96*	solid	36x4d	36x4d	amid-u	U. S. L.*	23*	44*	6*	280*	40*	30*	in wheel-4	C-G
Couple-Gear AF	10,000	3,900	3,100	100*	s & st	36x5d	64x5½	amid-u	U. S. L.*	27*	44*	6*	330*	35*	25*	in wheel-2	C-G
Couple-Gear A	10,000	4,650	3,900	96*	solid	36x5d	36x5d	amid-u	U. S. L.*	27*	44*	6*	330*	40*	30*	in wheel-4	C-G
Couple-Gear SD	14,000	5,250	4,400	96*	solid	36x6d	36x6d	amid-u	U. S. L.*	33*	44*	6*	400*	40*	30*	in wheel-4	C-G
G.V	1,000			89	solid	36x2½	36x2½	amid-u	Exide-Ir*	9*	44*	4*	133*		45*†	in rear-1	G.E.
G.V	2,000			104	solid	36x3½	36x3½	amid-u	Exide-Ir*	11*	44*	5*	169*		45*†	in rear-1	G.E.
G.V	4,000			112½*	solid	36x4	36x3d	amid-u	Exide-Ir*	15*	44*	6*	227*		45*†	in rear-1	G.E.
G.V	7,000			132½*	solid	36x6	36x4d	amid-u	Exide-Ir*	17*	44*	6*	268*		40*†	in rear-1	G.E.
G.V	10,000			141½*	solid	36x7	36x5d	amid-u	Exide-Ir*	19*	44	6*	298*		35*†	in rear-1	G.E.
Lansden S	750	1,850	1,175	90	cush	34x3	34x4	u-seat	Edison-A4		60	10			60	unit-x-1	G.E.
Lansden M	1,000	2,310	1,500	90	solid	36x2½	36x3	amid-u	Edison-A4		60	10			60	unit-j-1	G.E.
Lansden M	2,000	2,900	1,700	106	solid	36x3	36x3½	amid-u	Edison-A6		60	10			60	unit-j-1	G.E.
Lansden M	4,000	3,660	2,100	120	solid	36x4	36x3d	amid-u	Edison-A8		60	10			50	unit-j-1	G.E.
Lansden M	7,000	4,455	2,475	130	solid	36x5	36x4d	amid-u	Edison-A10		60	10			50	unit-j-1	G.E.
Lansden M	10,000	5,190	2,850	142	solid	36x6	36x5d		Edison-A12		60	10			50	unit j-1	G.E.
Lansden Tractor	20,000	3,660	2,100	58	solid	30x4	30x5	amid-o	Edison-A8		60	10			60	rear-1	G.E.
Walker M	1,000			90*	solid	34x3	36x3½	amid-u	Edison*		60*				75*	unit-x-1	West
Walker K	2,000			92*	solid	34x3	36x4	amid-u	Edison*		60*				75*	unit-x-1	West
Walker L	4,000			107*	solid	38x4	38x6	amid-u	Edison*		60*				65*	unit-x-1	West
Walker D	6,000			126*	solid	36x5	38x4d	amid-u	Edison*		60*				60*	unit-x-1	West
Walker E	8,000			130*	solid	36x6	38x5d	amid-u	Edison*		60*				60*	unit-x-1	West
Walker N	10,000			136*	solid	36x7	38x6d	amid-o	Edison*		60*				50*	unit-x-1	Wset
Ward WS	750	760		88	solid	32x2½	32x2½	u-seat	Ward*		42*	3*	100*		35*	amid-1	West
Ward EO	1,000	1,250		90	solid	32x2½	34x6	amid-u	Ward*		42*	3*	127*		45*	amid-1	West
Ward EA	2,000	1,500		99	solid	34x3	36x4	amid-u	Ward*		42*	3*	153*		40*	amid-1	West
Ward EB	4,000	1,900		111	solid	36x4	38x6	amid-u	Ward*		42*	3*	204*		35*	amid-1	West
Ward EC	7,000	2,450		132	solid	38x6	40x3½d	amid-u	Ward*		42*	3*	280*		30*	amid-1	West
Ward ED	10,000	2,950		152	solid	40x3½d	42x5d	amid-u	Ward*		42*	3*	357*		25*	amid-1	West

Industrial Trucks

Buda A	4,000			44	solid	16x3½	16x3½	amid-u	Exide-Ir*	11*	16*	2*	157½*			-1	G.E.
Buda C	4,000			52	solid	10x3½	16x3½		Exide-Ir*	11*	15*	1*	157½*			-1	G.E.
Buda TW				41	solid	16x3½	20x3½	rear-o	Edison-A6		30		225			amid-	G.E.
Buda CE	4,000			52	solid	10x3½	16x3½	rear-o	Exide-Tr*	11*	15*	1*	157½*			unit-j-2	G.E.
Dynamic A	4,000	1,550		60	solid	20x2½	20x3½	amid-u	Exide-Ir	9*	24	2	126*			amid-1	West*
Dynamic B	4,000	1,500		49	solid	20x3½	20x3½	amid-u	Exide-Ir	9*	24	2	126*			amid-1	West*
Electromobile EJ				30	solid	20x3	20x3	front-o	Exide-Ir*	11*	24*	2	158*		43*	unit-j-1	Wag
Elwell-Parker SA-SC-SE					solid	27½x3½	27½x3½	front-o	lead*	15*	12*		196*			front	
Elwell-Parker DD-DG					solid	27½x3½	27½x3½	front-u	lead*	15*	12*	1*	196*			front	
Elwell-Parker IB-ID					solid	15x3½	15x3½	front-u	lead*	17*	12*		192*			front	
Elwell-Parker F-W					solid	21½x3½	10½*x3½	amid-u	lead*	15*	12*		196*			front	
Elwell-Parker F-I					solid	21*x3½	10½*x5	u-hood*	lead*	15*	24*		392*			front	
Elwell-Parker					solid	21½x3½	10½x5	front-u	lead*	15*	12*		196*			front	
Elwell-Parker E					solid	21½x3½	10½x5	u-hood	lead*	15*	12*	1*	196*			front	
G.V	2,000			42½	solid	20x3	20x3	amid-u	Philadelphia-WTX*	17*	12*	1*	204*		25*†	rear-2	G.E.
G.V	2,000			59	solid			amid-u	Philadelphia-WTX*	17*	12*	1*	204*		25*†	rear-2	G.E.
Hunt	4,000			58	sold	20x3½	20x3½	amid-u	Edison-A4*	9*	36*	6*	150*			rear-1	Diehl
Mercury Z		1,580		40⅝	solid	15x3½	20½x3½	u-hood-r	Edison	6	30	5	225	50		-1	West*
Mercury U		3,675		63	solid	22x3½	27½x4½	u-hood-r	Edison	10	60	6	375	60		amid-1	West*
Mercury X		2,065		38	solid	16x3	20x3½	u-hood-r	Edison	6	40	5	225	50		amid-1	West*

ABBREVIATIONS: General, *, *with other options;* opt, *optional.* **Tires, Kind,** cush, *cushion;* s & st, *solid in front and steel in rear.* **Tire Sizes,** d, *dual.* **Battery Location** amid-u, *amidships, underslung below frame;* front-o, *at front, over frame;* amid-o, *amidships over frame;* rear-o, *at rear, over frame;* u-hood, *under hood;* u-hood-r, under *hood in rear;* front-u, *in front, under frame;* u-seat, *under seat;* **Battery, Make and Type,** Exide-Ir, *Exide-Ironclad type.* **Miles per Charge, Loaded,** †, *half way light, half loaded.* **Motor, Location and Number,** amid, *amidships;* unit-j, *unit with jackshaft;* unit-x, *unit with axle.* Numbers following *refer to number of motors in chassis.*

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Commercial Vehicle Chassis Listed on for the 1917 Season

Designed for Indoor Application

MOTOR					CONTROLLER			DRIVE					SPRINGS		CONTROL		
Winding	Horse-power	Voltage	SPEED IN MILES PER HOUR		Location	SPEEDS		GEARING		Total Gear-Ratio	Torque Taken By	Propulsion Taken By	Front	Rear	Steer	Controller Lever	Name and Model
			Light	Loaded		Ahead	Reverse	First Reduction	Final Reduction								
series	2.6	85*	12	10	u-seat	4	2	s-chain	dbl chn	10.82–1		rad-rd	½-ell	½-ell	wheel-l	l-seat	Atlantic 1–C
series	2.6	85*	11	9	u-seat	4	2	s-hcain	dbl chn	10.82–1		rad-rd	½-ell	½-ell	wheel-l	l-seat	Atlantic 2–C
series	3.9	85*	10	8	u-seat	4	2	s-chain	dbl chn	9.95–1		rad-rd	½-ell	½-ell	wheel-l	l-seat	Atlantic 3–C
series	6.0	85*	9	7	u-seat	4	2	s-chain	dbl chn	13.48–1		rad-rd	½-ell	½-ell	wheel-l	l-seat	Atlantic 5–C
series	2.5	85*	15	13½	st-col	4	2	spur-gear	spur-gear	10.00–1	rad-rd	rad-rd	¾-ell	½-ell	wheel-l	u-wheel	C.T
series	3.2	85*	14	12	st-col	4	2	spur-gear	spur-gear	11.50–1	rad-rd	rad-rd	¾-ell	½-ell	wheel-l	u-wheel	C.T
series	5.0	85*	12	10	st-col	4	2	spur-gear	spur-gear	12.14–1	rad-rd	rad-rd	¾-ell	½-ell	wheel-l	u-wheel	C.T
series	7.0	85*	11	9	st-col	4	2	spur-gear	spur-gear	17.32–1	rad-rd	rad-rd	¾-ell	½-ell	wheel-l	u-wheel	C.T
series	7.0	85*	9	7	st-col	4	2	spur-gear	spur-gear	20.14–1	rad-rd	rad-rd	½-ell	½-ell	wheel-l	u-wheel	C.T
series	12	88	12	9	btw seats	5	5	direct	bevel	25.00–1	rad-rd	rad-rd	½-ell	½-ell	wheel-r	btw seats	Couple-Gear H
series	10	88	9	7	btw seats	5	5	direct	bevel	25.00–1	rad-rd	rad-rd	½-ell	½-ell	wheel-r	btw seats	Couple-Gear AF
series	12	88	10	8	btw seats	5	5	direct	bevel	25.00–1	rad-rd	rad-rd	½-ell	½-ell	wheel-r	btw seats	Couple-Gear A
series	20	88	10	8	btw seats	5	5	direct	bevel	25.00–1	rad-rd	rad-rd	½-ell	½-ell	wheel-r	btw seats	Couple-Gear SD
series	2.5	85*	13½	12	u-seat	5	2	s-chain	dbl chn	10.2–1	springs	rad-rd	½-ell	½-ell	wheel-l	l-seat	G.V
series	3.4	85*	11½	10	u-seat	5	2	s-chain	dbl chn	10.76–1	springs	rad-rd	½-ell	½-ell	wheel-l	l-seat	G.V
series	4.6	85*	10½	9	u-seat	5	2	s-chain	dbl chn	11.61–1	springs	rad-rd	½-ell	½-ell	wheel-l	l-seat	G.V
series	5.6	85*	9½	8	u-seat	5	2	s-chain	dbl chn	13.95–1	springs	rad-rd	½-ell	½-ell	wheel-l	l-seat	G.V
series	6.8	85*	8½	7	u-seat	5	2	s-chain	dbl chn	13.95–1	springs	rad-rd	½-ell	½-ell	wheel-l	l-seat	G.V
series		60		15	u-hood	4	2	spur-gear	bevel	12.00–1	t-arm	springs	¼-ell	¼-ell	wheel-l	u-wheel	Lansden S
series		60		12	u-hood	4	2	bevel	dbl chn	8.00–1		rad-rd	¼-ell	½-ell	wheel-l	u-wheel	Lansden M
series		60		10	u-hood	4	2	bevel	dbl chn	10.00–1		rad-rd	¼-ell	½-ell	wheel-l	u-wheel	Lansden M
series		60		9	u-hood	4	2	bevel	dbl chn	13.00–1		rad-rd	½-ell	½-ell	wheel-l	u-wheel	Lansden M
series		60		7	u-hood	4	2	bevel	dbl chn	13.00–1		rad-rd	¼-ell	½-ell	wheel-l	u-wheel	Lansden M
		60		6	u-hood	4	2	bevel	dbl chn	14.50–1		rad-rd	¼-ell	½-ell	wheel-l	u-wheel	Lansden M
series		60	8	5	u-seat	4	2	s-chain	dbl chn	9.00–1		rad-rd	½-ell	½-ell	wheel-l	u-wheel	Lansden Tractor
series	3.0	60*	17	15	u-seat	5	5	direct	plan	16.87–1	springs	springs	½-ell	½-ell	wheel-l	l-seat	Walker M
series	3.5	60*	16	14	u-seat	5	5	direct	plan	16.87–1	springs	springs	½-ell	½-ell	wheel-l	l-seat	Walker K
series	4.0	60*	16	14	u-seat	5	5	direct	plan	16.14–1	springs	springs	½-ell	½-ell	wheel-l	l-seat	Walker L
series	5.0	60*	13	12	u-seat	5	5	direct	plan	15.57–1	springs	springs	½-ell	½-ell	wheel-l	l-seat	Walker D
series	6.0	60*	12	11	u-seat	5	5	direct	plan	15.57–1	springs	springs	½-ell	½-ell	wheel-l	l-seat	Walker E
series	6.5	60*	12	10	u-seat	5	5	direct	plan	18.83–1	springs	springs	½-ell	½-ell	wheel-l	l-seat	Walker N
series	2					4		direct	sp-bev				½-ell	½-ell	wheel-l	u-wheel	Ward WS
series						4		chain	dbl chn				½-ell	½-ell	wheel-l	l-seat	Ward EO
series						4		chain	dbl chn				½-ell	½-ell	wheel-l	l-seat	Ward EA
series						4		chain	dbl chn				½-ell	½-ell	wheel-l	l-seat	Ward EB
series						4		chain	dbl chn				½-ell	½-ell	wheel-l	l-seat	Ward EC
series						4		chain	dbl chn				½-ell	½-ell	wheel-l	l-seat	Ward ED

Industrial Trucks

series		24	7	4½	u-plat	3	3	spur-gear	worm	16.2–1	t-arm		coil	coil	lever-r	l-plat	Buda A
series		24	7	4½	u-plat	3	3		worm						lever-r		Buda C
series		24	7	4½	u-seat	3	3		worm						wheel		Buda TW
series		24	7	4½	u-plat	3	3	spur-gear	worm		t-arm				lever-r	l-plat	Buda CE
series	2.3	48	7	4½	u-plat	4	4	worm	bevel-4	16.4–1	sub-f	sub-f	coil	coil	wheel-c		Dynamic A
series	2.3	48	7	4½	u-plat	4	4	worm	bevel-4	16.4–1	sub-f	sub-f	coil	coil	wheel-c		Dynamic B
series		30*	12	7	u-plat	4	4	s-chain	dbl chn	14.0–1		rad-rd	coil	coil	lever-l	r-seat	Electromobile EJ
series		24			in dash	3	3	none*	top wm-f*						lever-r	left	Elwell-Parker SA–SC–SE
series		24			in dash	3	3	none*	top wm-f*						lever-r	left	Elwell-Parker DD–DG
		24			in dash	3	3	none*	top worm						lever-r	left	Elwell-Parker IB–ID
		24				3	3	spur-gear	sp-gea-f						lever-r	left	Elwell-Parker F–W
series		24			in dash	3	3	none*	top wm*						lever-r	left	Elwell-Parker F–I
series		24				3	3	spur-gear	sp-gear-f						lever-r	left	Elwell-Parker
series		24			in dash	3	3	spur-gear	sp-gear-f						lever-r	left	Elwell-Parker E
series	2.6	24	8½	7	u-plat	3	3	direct	spur-gear	8.85–1	pdstl	pdstl	coil	coil	lever		G.V
series	2.6	24	8½	7	u-plat	3	3	direct	spur-gear	8.85–1	pdstl	pdstl	coil	coil	lever		G.V
series	1.7	36	7	5	u-seat	3	3	spur-gear	spur-gear	10.00–1	t-arm				lever		Hunt
series		32	8	2	u-seat	3	2	worm	worm	16.50–1	sub-f	sub-f	none	none	lever-l	btw seats	Mercury Z
series		60	7	2½	u-seat	3	2	worm	worm	16.00–1	t-arm	rad-rd	trans-x	½-ell	wheel-l	btw seats	Mercury U
series		40	6½	2	u-seat	3	2	worm	worm	17.00–1	sub-f	sub-f	½-ell	½-ell	lever-l	btw seats	Mercury X

ABBREVIATIONS: (continued). **Controller, Location,** u-seat, *under seat:* st-col, *on steering column:* u-plat, *under platform:* u-hood, *under hood:* btw seats, *between seats.* **Drive, Gearing, First Reduction,** s-chain, *silent chain.* **Final Reduction,** dbl chn, *double chain;* sp-bev, *spiral bevel gears* :plan, *planetary gears;* -f, *to front wheels;* -4, *to all four wheels.* **Torque Taken By,** t-arm; *torque arm;* sub-f, *sub-frame* pdstl, *pedestal:* rad-rd, *radius rods.* **Propulsion Taken By,** rad-rd, *radius rods:* sub-f, *sub-frame;* pdstl, *pedestal.* **Springs,** ¼-ell, *one-quarter elliptic;* ½-ell, *half-elliptic;* ¾-ell, *three-quarters-elliptic;* trans-x, *transverse X shape or reversed elliptic.* **Control, Steer** -l, *to the left;* -r, *to the right:* -c, *in the center.* **Controller Lever,** u-wheel, *under steering wheel;* l-seat, *to left of seat;* r-seat, *to right of seat:* btw seats-*between seats,* cent, *center;* l-plat, *to left of platform.*

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Trailers Finding Definite Field of Utility

Proper Applications Yield Large Returns

CONSPICUOUS among developments of the motor truck industry of the last 2 years is the growth of the trailer. The trailer business existed many years previous to 1914, but its production development and the increase in the number of concerns manufacturing trailers belong to the last 2 or 3 years.

Trailer manufacture is rapidly attaining the stature of a growing industry. There are to-day over a score of concerns manufacturing trailers for use with motor trucks and passenger cars. True, many of these concerns are new—a few have been getting under headway this year; and although some have scarcely entered on production, they must be counted.

Recently a meeting of trailer manufacturers for the purpose of forming a national association was held, and the formative steps of such an association are now under way. Nothing assists a new and growing industry like an association; but it will be necessary for such an association to work in close contact with truck organizations in order that both tractor and trailer develop to mutual advantage.

The stature of the trailer industry to-day is not definitely known. It has been estimated by trailer makers that there are to-day between 10,000 and 15,000 trailers in use in the U. S. A. This is a wide range for so small a total and THE COMMERCIAL VEHICLE does not stand back of the figures other than as being given by some trailer makers.

Knox Was Pioneer

The history of the trailer industry goes back several years, Knox being the first concern to take it up seriously with its three-wheeled tractor design now so familiar all over the country, having lately been succeeded by a four-wheeled design. The Knox pioneering was done by C. H. Martin, at that time connected with the Knox organization and now president of his own company, which manufactures a fifth-wheel device for trailer attachment and small trailers.

Following the early Knox development, other work was taken up in different sections; so that to-day an industry is with us, an industry working for its own self-control and an industry that has a useful future ahead of it.

Trailers are being manufactured to-day in capacities ranging from 600 lb. to 7 tons, and some special ones for higher capacities. There is a general standard of trailer capacity best suited for truck use; thus a 5-ton truck uses a trailer of equal capacity. The same applies to trucks of smaller capacities, but when you get to truck capacities of 1 ton and under you frequently find trailers of greater capacity used. A fair standard of trailer load is to have it the same as the truck load.

Of the 10,000 to 15,000 trailers in use to-day they are not found in any special sections of the country or in any special industries, or in use with any special makes of trucks. Their use is general. They are practically suitable for all industries, and can generally be used in all industries. Deep mud, slippery road surfaces and deep sand naturally present conditions not favorable to trailer use; but they are used in such conditions. It is only reasonable to acknowledge that a 5-ton truck will travel faster through deep sand when it is carrying its own 5-ton load than when it is carrying an additional 5 tons on a trailer which it must haul along. The same applies to deep mud and to slippery hills due to ice or other unusual conditions. The trailer can be used in such circumstances, but speed is naturally cut down a great deal.

A canvass of the field in which trailers are becoming quite generally in use gives industries of all kinds. Among them might be noted wholesale drug houses in large cities, large department stores, milk-distribution people, creameries, electric light and power concerns, telephone organizations, contractors, plumbers, gas companies and farmers.

There is at present much debate in connection with the efficiency of trailers. Like every other question, there are two sides to it. The trailer manufacturer has been up to the minute in collecting cost figures on the use of trailers in different fields of work. On the other hand, truck users have been experimenting as to what are the most favorable fields for trailer use. Trailer manufacturers cite from actual use showing how trailers have cut the cost per ton-mile from 6.6 cents to 5 cents. They show how a single truck has been able to handle 18 tons per day over a 56-mile trip as compared with a trailer handling 31 tons over 48 miles. It can be seen that the trailer has reduced the speed approximately 15 per cent, but the load carried has been nearly doubled.

From the consumer's viewpoint varying results with the use of trailers have been obtained, but all show a perceptible increase in efficiency. A recent example was that of a contractor making the excavation for a large public building in the heart of the city, where traffic was heavy. It was found in this case best to use a 5-ton truck with 5-ton trailer during the day and to use the 5-ton truck alone, or without the trailer, at night. Under this arrangement the efficiency was the same during day hours as at night. During the day traffic was slow, congestion very great and the truck could handle its own load plus that of the trailer at the speed of street traffic. At night, when the streets were practically empty, the truck could make its regulation speed and it was found advisable to operate the truck as a unit. This one example is illuminating in that it points to a great field of trailer usefulness, namely, in congested sections where a truck cannot operate at its intended speed.

Trailers Save Loading Time

One of the great advantages of the trailer is the time saved in loading. A large concern operating several trucks or tractors can have a number of trailers, some of which are always at the loading platform while the trucks are at work. One large grocer uses six trucks and nine trailers. By this system he has cut his loading time from 2 hr. to 5 min. Individual trucks were a failure, due to loading delay. But now trucks have entirely replaced horse equipment because of the trailer cutting down the lost loading time. What this grocer has done is being done in other industries. The trailer is particularly adaptable to all lines of work.

There are some industries in which the trailer is a particular boon to the consumer, namely, where goods of relatively light weight and great bulk have to be carried. On the other hand, we find trailers equally efficient in the transportation of road material, etc. It cannot be argued that they are for any particular field of work, but rather that they are for all fields.

Universal Utility

The trailer has a large possible field of utility and can be used in practically any service. It can be made in wheelbase lengths to meet conditions; in fact, it is flexible in all load-carrying respects. Trailers are at present found in all kinds of industries, such as road construction, breweries, automobile factories, general transportation lines, foundry work, lumber, tobacco industries, etc.

The attachment of trailers does not offer any serious difficulties. It is generally conceded that the trailer must be pulled through a drawbar which attaches between buffer springs so that when starting or stopping any consequent jar is absorbed by these springs. This not only prevents the transmission of unnecessary strains to the tractor vehicle, but also saves the trailer.

With semi-trailers, where the forward end of the load rests directly upon the tractor vehicle, there is not any necessity for springs, the weight resting on the fifth-wheel construction.

The question of reversing with a tractor is an important matter when operating in congestion zones, narrow streets, alleys, etc. With a semi-trailer, reversing the load into any position is as easily done as with a team of horses. With a four-wheel trailer the ability to reverse calls for special constructions. There are trailers which steer through all four wheels, and you can back up with them the same as with a unit car. There are other trailers, known as reversible types, which when you are backing up with them you require an additional person to steer the rear wheels of the trailer.

C. H. Martin, president of the Martin Rocking Fifth Wheel Co., which manufactures semi-trailers for Ford cars and a rocking fifth-wheel device, states that his company has 400 semi-trailers in use at present and approximately 800 fifth-wheel attachments, all of which has been done since March, 1916. The work is being done by contract, the bodies being built by different wagon factories all over the country.

The Troy Wagon Works Co. started its trailer development movement in 1911, testing its vehicles for 2 years before marketing them. To date 500 installations have been made in this country and many in foreign lands. These trailers are used on more than fifty different makes of trucks. These trailers range from 1½- to 5-ton capacity, and have reversible and non-reversible features.

The Watson Wagon Co. has built approximately 500 of its trailers and has a capacity to-day for fifty a week. The greater part of its work is building semi-trailers to be used with the Watson trac-

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tor. Watson trailers are used most in connection with repeated hauls over distances of 3 to 10 miles. In this service the company claims that cost per ton-mile can be reduced approximately one-half.

The Detroit Trailer Co., Inc., claims to have produced 2000 trailers to date and to have a capacity for two four-wheel trailers and four two-wheel trailers per day. Its trailers range in capacity from 1½, 3 and 5 to 7 tons.

The Miami Trailer Co., marketing light trailers with a capacity from 800 to 1250 lb., builds these in two-wheel and four-wheel types. The company has built up to date over 2000 trailers and has a factory capacity for 200 per month. The company claims that the extra cost of operating a trailer does not exceed 10 per cent of the original cost.

The Warner Mfg. Co., which began in the trailer field manufacturing light types, will be ready in a few weeks to make delivery on its heavy types with such capacities as 2½, 4½ and 7 tons. Light trailers have a multiplicity of uses with farmers, dairy firms, etc.

Sechler & Co. began construction in the early part of 1915 and started work during the present year. The company has factory facilities for an output of fifty a day. Models of all kinds are manufactured with capacities from 1250 lb. up. These trailers are of the four-wheel type and suitable for all types of bodies and all kinds of service.

Fox Bros. & Co. report having manufactured 200 trailers to date and to have a capacity of five per day. The trailer is a two-wheel design intended for attachment to passenger cars. It has a capacity of 1200 lb.

In addition to these, there are a number of makers on whom no reports are available. A great many trailers of special design adapted to special requirements are produced by local wagon builders and by the truck manufacturers. Following is a list of prominent trailer builders:

American Carriage Co., Kalamazoo, Mich.
Auto Specialty Mfg. Co., 1207-15 G Ave., E., Cedar Rapids, Ia.
Bettendorf Trailer Co., Bettendorf, Ia.
Buob & Scheu, 500 E. Court S., Cincinnati, O.
Columbia Motor Truck & Trailer Co., Pontiac, Mich.
Columbia Wagon Co., Columbia, Pa.
Commercial Sales Co., Plymouth Bldg., Minneapolis, Minn.
Curtis Trailer Co., 1411 Hennepin St., Minneapolis, Minn.
Defiance Carriage Co., Defiance, O.
Delker Co., George, Henderson, Ky.
Detroit Trailer Co., 671 Atwater St., E., Detroit, Mich.
Dunkley Co., Kalamazoo, Mich.
Emerson-Brantingham Implement Co., Rockford, Ill.
Erie Trailer Mfg. Co., Erie, Pa.
Frazier & Co., W. S., Aurora, Ill.
Harper Buggy Co., Columbia City, Ind.
Hopp Carriage Co., Mifflinburg, Pa.
Laura, John P., 40 S. Monro St., Coldwater, Mich.
Lincoln—See Auto Specialty Mfg. Co.
Lion Buggy Co., Dept. T. D., Cincinnati, O.
Los Angeles Trailer Co., 17th and Main Sts., Los Angeles, Cal.
Lowell Cutter Co., Lowell, Mich.
Martin Carriage Works, York, Pa.
Martin Rocking Fifth Wheel Co., 244 Main St., Springfield, Mass.
Mayer Co., 539 Orleans St., Chicago, Ill.
Meeker Mfg. Co., Linden & Huffman Aves., Dayton, O.
Miami Trailer Co., 406 E. Main St., Troy, O.
Michigan Auto Trailer Co., Detroit, Mich.
Mifflinburg Buggy Co., Mifflinburg, Pa.
Miles Mfg. Co., 302 E. Franklin St., Jackson, Mich.
Ohio Trailer Co., 57 Doan Ave., Cleveland, O.
Parry Mfg. Co., 110 Parry Ave., Indianapolis, Ind.
Page Bros. Buggy Co., Marshall, Mich.
Press Sons, Jacob, Fulton and Halsted Sts., Chicago, Ill.
Puffer-Hubbard Mfg. Co., 26th St. and 32d Ave., S., Minneapolis, Minn.
Randolph, H. C., Jonesville, Mich.
Rogers Bros. Co., Albion, Pa.
Sechler & Co., 663 E. Fifth St., Cincinnati, O.
Shadbolt Mfg. Co., Flushing Ave. and Cumberland St., Brooklyn, N. Y.
Shattuck Trailer Co., Palace Bldg., Minneapolis, Minn.
Simplex Short-Turn Trailer Co., Union Bldg., Anderson, Ind.
Stunkard Bros. Buggy Co., 24-26 N. Meridian St., Brazil, Ind.
Troy Wagon Works Co., Troy, O.
Universal Trailer Co., 1118-20 S. Michigan Ave., Chicago, Ill.
Variety Mfg. Co., 340-52 N. Sacramento Bldg., Chicago, Ill.
Warner Mfg. Co., Beloit, Wis.

Battery Service Progress Promises Electrics' Growth

Several Hundred Trucks Now Operating Geveco Plan in Ten Cities —Many Others on Similar Private Service

BATTERY service systems and their increased development and use during the past year have opened a new era in the operation of electric trucks in installations of one, two or three vehicles. The system is based on the principle that it is more economical to maintain an electric truck as one of a fleet of many than as an individual vehicle. Various forms of the system are now in use in more than ten cities throughout the United States. The system's greater development in 1916 has proved one of the most far-reaching steps in the advancement of the electric truck industry during the year and has increased the sales of trucks wherever introduced.

The larger use of battery service has occasioned a greater degree of co-operation between truck user, truck manufacturer and the central station interests who have supplied the current for the battery charging.

What It Is

The system in brief consists of the purchase of an electric truck less battery, the vehicle being supplied with a specially-designed detachable battery cradle. By the use of this interchangeable cradle the company furnishing the power is enabled to exchange a discharged or partly-discharged battery for a fully-charged one in from 2 to 5 min.

The current used is sold by the mile, according to the size of the vehicle and the amount of mileage as recorded by the odometer. An additional fixed sum is charged for the battery service and inspection, and a third fixed charge if the vehicle is garaged at the point where the batteries are exchanged. Both of these latter charges are fixed for any particular size of vehicle, although, of course, they are graded according to the truck capacity, and the rate for current decreases as the mileage increases.

Service Benefits User

For the user the battery service system eliminates practically all of the objections which have formerly mitigated against the more general use of the electric as compared with the gasoline truck. These objections included: A high initial cost of vehicle; uncertainty in the small user's mind as to the efficiency and life of the battery and the trouble of its care and that of the charging apparatus necessary; the limited mileage on one charge of the battery and the uncertainty as to the actual cost of truck operation.

All of these objections have been overcome by the battery service plan, in which the user does not buy, own or care for the batteries, but concerns himself only with the actual operation of the trucks. Without batteries the prices of the trucks are reduced anywhere from 20 to 38 per cent. In addition, the exchange battery feature of the system eliminates the limitations of battery mileage and enables the truck owner to operate his vehicle 24 hr. daily, if he so desires, by simply changing the batteries as fast as they become exhausted. As the charges for the battery service and inspection are fixed no matter how many batteries are used in a day, and the charge for the current consumed based on the mileage covered, the truck owner pays in exact proportion to what he receives. Furthermore, these charges can be ascertained easily and often determined in advance.

Finally, the system offers the purchaser a substantial reduction in truck investment in addition to the elimination of charging and garage apparatus. It also offers unlimited mileage and a reduction of all battery-care costs because of the savings effected in the handling of a large instead of a small number of batteries, as would be the case were the truck owner to maintain his own batteries.

The advantages of the system to the truck maker are, of course, obvious, in that it tends to increase the sales of trucks. The advantage to the central station supplying the current is that it offers a ready means of disposing of the off-peak current.

Systems in Operation

The system as outlined above is not new, the General Vehicle Co. and the Hartford Electric Light Co., Hartford, Conn., having inaugurated such a system as far back as June, 1912. Before that several department stores, mail transfer concerns, textile mills and others developed private battery exchange methods.

The General Vehicle Co.'s system, which is substantially as outlined above, is now in operation in nine other cities besides Hartford, Conn., with several others pending. The cities in which vehicles are now being operated on the system include Spokane, Wash.; Boston, Mass.; Baltimore, Md.; Harrisburg, Pa.; San Francisco and Los Angeles, Cal.; Worcester and Fall River, Mass., and Wichita, Kan. In all, there are several hundred electric trucks now being operated on the Geveco, or General Vehicle Co.'s, system in the ten cities mentioned.

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Opportunity Beckons the American Motor Truck in South America's Large Expanses

Part VI

Chile's Immense Nitrate Industry Offers Large Truck Market

By David Beecroft

SANTIAGO, CHILE. — One of the greatest fields for motor truck use in Chile is in the nitrate industry located in the north of the country where but few U. S. A. motor trucks are in use at the present time. This nitrate industry is one of the greatest in the country, and one that gives promise of enduring almost indefinitely. Surveyors assert that at the present rate of consumption there is a sufficient supply in the fields now located for 100 years.

The nitrate of soda industry, unknown to a great many, is a kind of mining in which the nitrate deposits are extracted from the earth and are then crushed, much as we crush rock for road construction in the U. S. A. It is then dissolved in tanks and the nitrate finally drained off. This nitrate is largely used for ammunition purposes, for soil fertilizer and for the manufacture of iodine. In fact nearly all of the world's supply of iodine finds its source in the nitrate fields of Chile.

Nitrate Now Shipped to the U. S. A.

Previous to the war the nitrate industry was entirely controlled by European steamship lines and the market centered almost entirely in Europe. To-day the nitrate is being shipped direct to the United States, thereby bringing our country in closer touch with this industry, which should mean much to the manufacturers of motor trucks.

It is questionable if motor trucks can find a more barren area in which to operate than on these nitrate fields of northern Chile. They are on a plateau 2700 ft. high and extend for a distance of nearly 500 miles north and south, and varying distances east and west. It is hard to find anything more desolate than this plateau. The nitrate zone is on a northeastern slope of the coast range of mountains and is practically a rainless territory. It is noted for the constancy and impetuosity of the winds and by the frequent dense fogs followed by electrical storms which are not accompanied by rain. This zone is not only treeless, but you cannot find a trace of vegetation on it.

Deposits Are Near Surface

The nitrate of soda is found in large saline deposits forming layers of varying thickness near the earth's surface, often coming almost to the surface itself. The nitrate is usually mixed with other salts of sodium and with other mineral salts of insoluble substances.

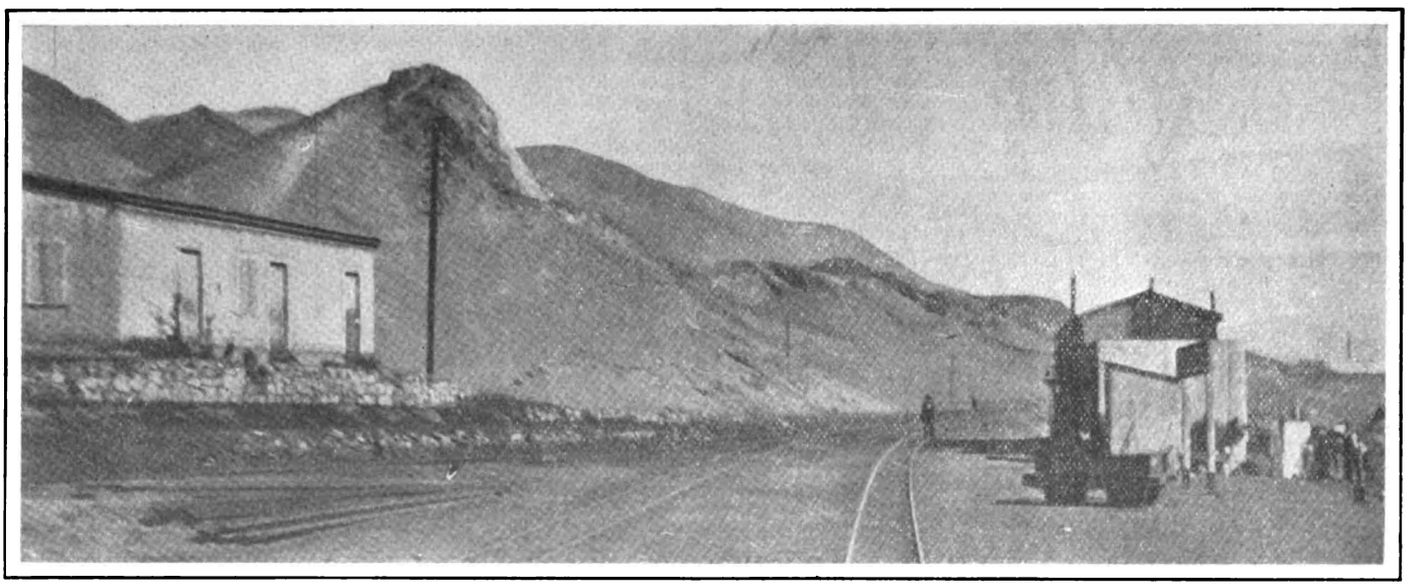
Up on this rainless, treeless, arid plateau, over 50,000 workmen are exclusively engaged in the mining and manufacture of the nitrate of soda. Over 12,000 workmen are engaged constantly day and night repairing the machinery used in the factories or *oficinas*, where the nitrate is crushed by huge machinery and then carried through the other stages of manufacture.

The volume of the nitrate industry is hard to comprehend. In 1913 2,722,254 tons of nitrate were manufactured. This represents 58 per cent of the world's supply used for various services. It is estimated that to date the total exports of nitrate from these fields has reached the amazing total of $1,800,000,000.

In these fields, where nature produces nothing save the nitrate, everything has to be imported for the manufacture of the nitrate as well as for the sustenance and clothing of the thousands engaged in the industry. It is in this work that the motor truck will find its special opportunities.

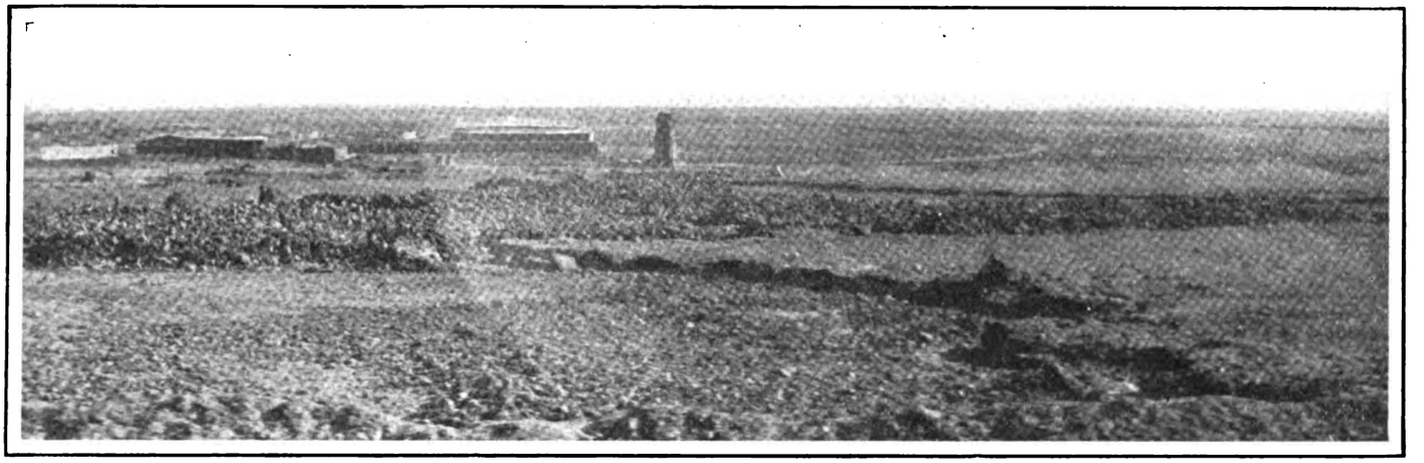
Fields on Arid Plateau

Before looking into the detailed possibilities of truck operation let us go through one of these nitrate fields and see first hand the work that has to be done and the conditions that have to be met. The three photographs reproduced herewith were taken as the train passed through the arid desert. If you took 100 snap-shots they would all tell approximately the same story. Here is a region between two mountain ranges without vegetation, almost without water, and far from all the commodities of civilized life. Here it has been necessary to create everything, to organize services, to bring from long distances all materials and all objects for supplying the necessity of man and animals, including water, fuel, food and provisions. The railroad has been the great server of this area, climbing as it does from the seacoast at Antifogasta, which is the nitrate port of the west coast. The railroads traverse the nitrate zone which in relative area might be compared to a strip of territory from New York to Buffalo and



On the railroad leading from the immense nitrate fields of Chile to Antofagasta, one of the chief Chilean ports on the western coast of South America. The hills of Antofagasta may be seen in the distance. Note the entire absence of trees and vegetation. Because of these conditions it is necessary to import all the food and all the fodder for animals used in mining and transferring the nitrate ores from the fields to the railroads. It is because of this high cost of animal maintenance and the severe heat under which the beasts must work that there is offered a fine opportunity for motor trucks. Some Jeffery Quads have already been put into this work

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A typical view of the nitrate fields in Chile. In the front and center foreground may be seen the huge lumps of nitrate ores which have been extracted by surface blasting. In the center background may be seen the *oficina*, or factory, in which the lumps are ground, and to the left some of the homes of the factory workers

ranging in width from 100 miles or more.

While the motor truck has nothing to do with the actual uprooting or mining of the nitrate from the earth, it can be used in transporting the huge lumps of nitrate from the fields to the factories or *oficinas*. Animal labor is largely used, but unquestionably motor power will be the dominant one in a few years.

The raw nitrate is called *caliche*. This *caliche* is generally found in layers, but it also occurs in efflorescent and other calcareous formations. At present the exact method of its formation by nature is not known and is imputed to various causes. Darwin maintains that nitrate has its origin in seaweed; Muntz and others contend that its formation is a result of the action of bacteria; others impute its formation to nitrogen contained in manures; and Williams and two or three others attribute its origin to atmospheric conditions.

How the Nitrate Is Extracted

The *caliche* is extracted from the nitrate fields, or *pampas*, as they call them, by explosions. Each explosion throws up large volumes of broken masses of nitrate. These broken masses are removed and sorted, the barren pieces, or those not containing nitrate, being thrown away. On this desert plateau the Chilean laborer works under a burning sun, over a calcinated soil, where he is tormented by incessantly bad winds.

The *caliche* is sent in large blocks from the nitrate fields to the refining plants or *oficinas*. It is transported from the fields by carts to the railway and thence to the *oficina*. At the *oficina*, the blocks are treated by different processes for separating the nitrate of soda from the other substances.

First the *caliche* as it comes from the *pampas* is thrown into the great crushers, which grind the blocks into small pieces. Elevators then carry these pieces to large square tanks, *cachuchos*, where the pieces are treated with boiling water. The muddy liquid of a red clay color obtained from the boiling contains large quantities of dissolved nitrate. It is carried on to large deposits and is then removed or drained off into large flat basins or crystallizing pans where it is allowed to cool, and where a large part of the nitrate crystallizes. When the crystallizing process is complete the mother liquid is run off. The crystallized nitrate is then put in sacks or shipped in other bulk forms by railroad to the seaport whence it is shipped to all the countries of the world.

For these manufacturing plants or *oficinas* large quantities of coal and petroleum are required. The imports approximate 642,000 tons of anthracite coal per year and over 200,000 tons of petroleum. This, like the food, water, machinery, and everything else connected with the industry, is brought by train from the seashore and distributed through the nitrate zone.

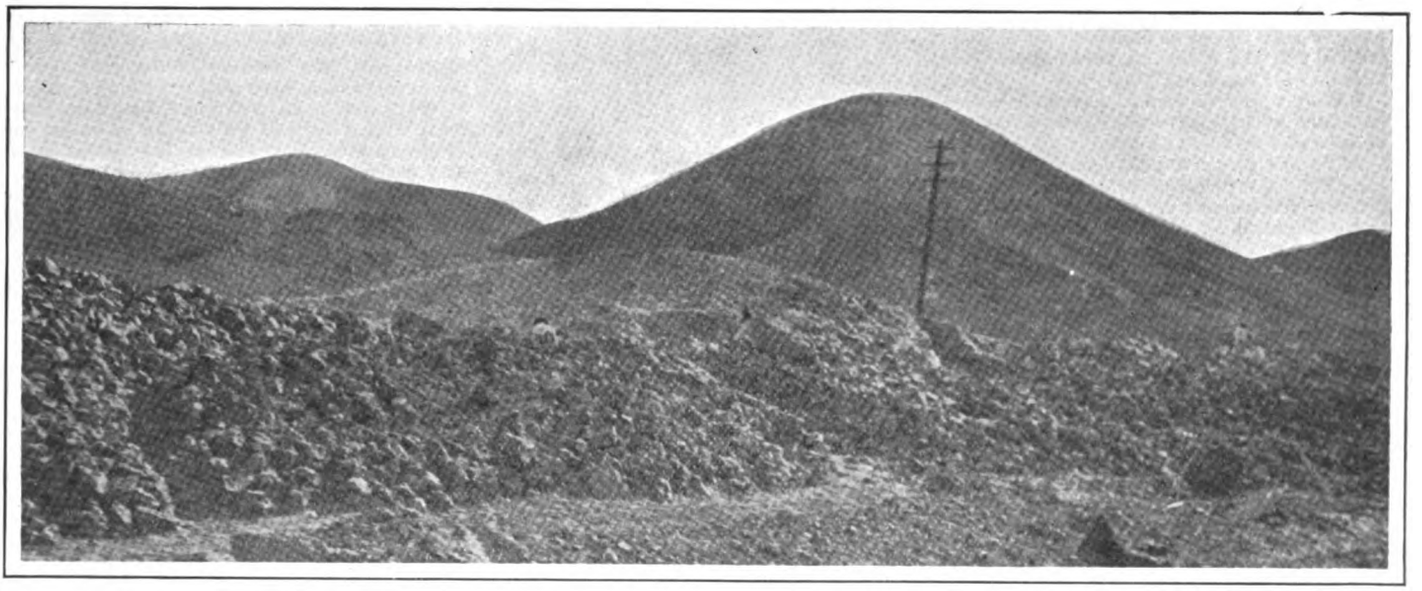
It is difficult to estimate the exact amount of money invested in this nitrate industry, but government reports of 1913 place the investment in machinery and all that goes to make up the industry at $144,000,000, U. S. gold.

Conditions Favorable for Trucks

When traveling by train through this country the *oficinas* with the homes of the workmen grouped around are the only permanent evidences of civilization that greet the eye. In addition to the workmen's homes are hospitals, supply stores and other buildings which go to make up a small industrial town.

So far as the possibility of using motor trucks in this zone, and in fact so

(*Continued on page* 59)



A close-up view of a portion of the nitrate fields in northern Chile as seen from the railway leading to Antofagasta. You can ride for hours and hours through these fields without finding any scenery different from that shown above. In the foreground may be seen the large lumps of nitrate-bearing substances ready to be hauled to the crushing factories by the slow-moving, large-wheeled ox or horse carts. The fields are located on the top of a rainless and treeless plateau 2,700 feet high. More than 50,000 men are employed exclusively in the nitrate mining. In 1913 58 per cent of the world's nitrate supply was obtained from these fields

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Proposed Standard Specifications for U. S. Army Truck

(*Continued from page* 16)

spark and throttle hand levers, must be in accord with S. A. E. standards.

Flanges must be fitted on the clutch and brake pedals to prevent the driver's feet from slipping off.

The pressure on the clutch pedal pad necessary to disengage the clutch should not be more than 90 lb. nor less than 70 lb.

33—*Steering Gear:* The steering gear may be of the screw and nut or the worm and wheel type.

The ratio of movement between the steering hand wheel and the front road wheels shall be such that for 360 deg. travel of the steering hand wheel, the road wheels will move not to exceed 30 deg. about the steering knuckle pivot. (Many opinions wanted on this.)

Throughout the steering gear, including all steering connection joints, adequate provision must be made for lubrication, and all steering connection joints must be protected by leather boots.

Electric Lighting

34—*Electric Lighting Equipment:* Current for electric lighting must be furnished from a 6-volt 100-amp. hr. storage battery and gear- or chain-driven generator on engine.

All wiring must be enclosed in metal conduits.

The following lamp equipment will be required:

Side-lamps—combination oil and electric, with 15 candlepower bulbs.

Tail-lamp—combination oil and electric, with 2 candlepower bulbs.

Side- and tail-lamps and side-lamp brackets must be interchangeable, as per drawing.

One swivel electric searchlight with 8 in. lens and 21 candlepower bulb, mounted on dash.

An electric instrument lamp with 2 candlepower bulb must be furnished, and also an 8 candlepower inspection lamp with 15 ft. removable socket cord.

35—*Road Clearance:* The following minimum road clearances must be maintained:

Under center of front axle, 9¾ in.

Under center of rear axle, 9¾ in.

Under flywheel housing or flywheel, 13 in.

36—*Brakes:* Two independent sets of double acting brakes must be equipped, either both on rear wheels or with one set on rear wheels and the other on transmission line back of transmission.

Brake adjustments must be readily accessible, and must be adjustable without the use of wrenches or special tools.

All brake clevises, pins, connections and threaded joints must be subjected to a rust-proofing process on their wearing surfaces.

The design must be such that the application of rear wheel brakes is not affected by relative movement between the frame and the axle.

37—*Gasoline System:* The gasoline tank must be made of drawn sheet steel with welded joints and thoroughly tinned inside and out. Soldered joints will not be acceptable.

Gasoline tanks must be of 30 gal. capacity and be interchangeable, as per drawing.

Tanks must be fitted with partitions to give two 5-gal. reserve compartments, and must be equipped with a two-way cock for the reserve compartments, combined with a shut-off outlet.

Gasoline tank must be located inside seat body, and mounting devices must be attached to seat body by means of bolts.

Pressure-feed of the gasoline is required, pressure to be supplied by engine driven pump arranged to maintain from 2 to 3 lb. pressure. An auxiliary fuel hand-pump is to be furnished, mounted on the dash. (Many opinions wanted on this.)

The fuel pipe from the tank to the carbureter is to be not less than ⅝ in. outside diameter, and all fuel and pressure pipes are to be properly clipped at suitable intervals, to prevent vibration and chafing.

All fuel and pressure piping is to be of copper, thoroughly annealed.

All fuel and pressure pipe connections are to be S. A. E. standard fittings.

38—*Driver's Seat:* Dimensions of driver's seat shall be in accordance with drawing.

The seat cushion must be covered with genuine leather and be fitted with suitable cushion springs.

Arm rests and seat back must be covered with genuine leather and padded with genuine hair.

The distance between the back of the dash and front of the seat cushion on all trucks must be 25 in.

39—*Dash and Floor Boards:* Dash and floor boards must be approximately the same overall width as seat body.

40—*Driver's Top:* Cape or buggy type of top must be furnished, as per drawing, and covered with first-class 12 oz. water-proof canvas.

A suitable boot or storm apron must be furnished, made of 12 oz. water-proof canvas.

41—*Sprags:* Road sprags must be fitted. These sprags must be of the triangular type and fitted with restraining chains and lifting device, as per drawing.

42—*Towing Hooks:* Towing hooks as shown on drawing, must be attached by rivets or bolts to all four corners of the frame.

43—*Body Holding-Down Devices:* Chassis design must be such that body holding-down devices, as shown on drawing, can be used.

44—*Paint:* Chassis shall be supplied painted with three coats of lead and oil, olive drab color, of the following composition:

6 lb. white lead ground in linseed oil.
1 lb. raw umber.
1 pt. turpentine.
½ pt. Japan drier.
1 qt. linseed oil.

Spare Parts

45—*Spare Parts:* The following spare parts must be furnished with each truck:

4 spark plugs with gaskets.
12 extra spark plug gaskets.
3 exhaust valves.
3 valve springs.
2 fan belts.
1 assortment of cotter pins, containing not less than 1 doz. of each size used on truck.
1 assortment of lock washers containing 1 doz. washers of each size used on truck.
1 set of radiator hose clamps.
1 length each of all rubber water hose connections.
1 radiator drain cock.
1 box of plain hexagon nuts, to include not less than six of each size on truck.
1 box of assorted castellated hexagon nuts, to include not less than six of each size on truck.
1 box of valve grinding compound, to contain two grades.
1 roll, 1 ft. by 2 ft., of 1/32 in. thick gasket material.
10 ft. secondary or high tension cable.
5 ft. primary or low tension cable.
1 metal box containing one set of electric light bulbs used.
1 box containing 1 set electric lighting system fuses.

46—*Tools:* Each truck must be furnished with the following tool equipment:

Tool Requirements

1 set of open end wrenches to fit all nuts on truck.
1 magneto wrench.
1 3 in. blade screw driver.
1 6 in. blade screw driver.
1 drop-forged all steel 12 in. adjustable wrench.
1 pair of 8 in. combination pliers.
1 valve lifting tool.
1 6 lb. pinch bar 42 in. long.
1 6 in. bastard file.
1 8 in. flat mill-cut file.
1 combination oil- and grease-gun with special tips to fit wheel hub, universal joints and other points requiring oil or grease in quantities.
1 socket wrench for carbureter nozzle.
1 4000-lb. capacity jack and handle.
1 5-lb. can of soft cup grease.

47—*Extra Oil and Water Supply:* Each truck shall be equipped with a cylindrical drawn steel welded tank with two compartments, one to carry 2 gal. of engine lubricating oil, and the other to carry 8 gal. of water, as shown on drawing, tank to be thoroughly tinned inside and outside and to be fitted with two faucets having ¾ in. through hole, snap spring lock plugs with square ends for use of wrench. No faucet handles to be fitted. This tank must be permanently and rigidly attached to the chassis.

48—*Tests:* Any manufacturer's model of truck designed for military purposes must satisfactorily undergo the following tests, which will be conducted by the War Department. All tests hereinafter specified will be made under a load of 5080 lbs. above the chassis, distributed as specified in paragraph 31.

49—*Ability:* On hard roads of 25 to 40 lb. per ton resistance to tractive effort, the fully loaded truck must climb, on high gear, a 5 per cent grade, and on low gear, a 25 per cent grade. Under the same road conditions, the fully loaded truck must be able to start from a standstill in low gear on a 25 per cent grade.

50—*Fuel and Oil Consumption:* On level hard roads of 25 to 40 lb. per ton resistance to tractive effort, the fully loaded truck must average, on straightaway running, 9 miles per gal. of gasoline, according to spec. in par. 14, and 200 miles per gal. of engine lubricating oil.

51—*Cooling Ability:* The cooling system must have a capacity as follows: At sea level and in an atmospheric temperature of 80 deg. Fahr. and with an initial water temperature of 150 deg. Fahr. the cooling system must be adequate to permit the engine to operate under maximum torque developed at between 600 and 700 r. p. m. in low gear, for a period of thirty minutes before the cooling water reaches the boiling point.

Are There Such Brakes?

52—*Brake Performance;* Each set of brakes must be powerful enough to slide the rear wheels in either direction on a hard road or 25 to 40 lb. per ton resistance to tractive effort. At least one set of brakes must be capable of handling the fully loaded truck at a maximum speed of 14 m. p. h. on a descent of 4 miles, averaging 8 per cent grade, without firing the brake linings.

53—*General Road Test:* In addition to the above tests, all military models submitted will be required to undergo a 2000 mile road test, with regular enlisted drivers, carrying a maximum load of 5080 lb. above the chassis, over give and take roads, embodying severe operating conditions.

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Electric Truck Troubles and Means Taken to Eliminate Them

PAPER READ BY F. E. WHITNEY AT CONVENTION OF THE ELECTRIC VEHICLE SECTION, N. E. L. A. AT CHICAGO LAST MAY

"There are a number of the items in the general development of electric vehicles which have enabled all of the manufacturers to benefit and produce a better article which will be of interest, and in order to do this I will attempt to bring out points in connection with the elements that go to make up the complete vehicle, namely: batteries, tires, motors, controllers, wiring, wheels, springs, bearings, etc., where troubles have been met and improvements made, enabling the manufacturer to reduce the weight, increase mileage range, reduce power consumption and reduce maintenance cost.

"*Batteries.*—The one item in the make-up of an electric vehicle which raises a question in the minds of the uninitiated is the question of the care and upkeep cost of the battery, as well as the question of whether or not the truck will be stranded, out of power, while on an important mission. This question in the minds of the public is the result of difficulties experienced by the small user principally in the care of his vehicle, due to lack of expert knowledge and to frailty on the part of the battery.

Battery Standardization Needed

"There has also been difficulty due to lack of standardization, in that an owner having batteries of different makes has found it necessary to use different sizes and shapes of battery jars for batteries having the same number of plates and rated capacity. These difficulties have largely been overcome by radical improvements in the general make-up of the battery, and I understand that real progress has been made toward standardization of battery jars that will greatly reduce the number of sizes and simplify the problem for the repair man. At the present time a number of manufacturers of lead acid batteries will guarantee to the user that it will not be necessary to dismantle his battery until the plates are exhausted and assuring a sufficient life of the plates to make the battery cost well within reasonable limits.

"Improvements have also been made in the nickel-alkali battery, so that to-day a user can easily select a battery suited to his needs and be able to secure reasonable service.

"It should also be noted that batteries are now generally connected permanently in series instead of being split up in series parallel combinations, thus eliminating troubles arising from this practice brought about by an occasional cell being missing or an open circuit in one section of the battery causing unequal discharge and other difficulties resulting from different parts of the battery not being in a uniform state of charge.

"The greatest benefit in battery development has been the reduction in weight, which has been accomplished by practically all of the battery manufacturers.

"There has also been considerable development in the means to prevent slopage of electrolyte and to enable the garage man to more easily flush the battery.

"In referring to the battery I feel that reference should be made to a plan that is meeting with popular favor and, in the opinion of the writer, will overcome the largest handicap to the satisfactory adoption of electric vehicles, namely, a form of service system whereby the user can secure from either a garage, central station or representative of the vehicle company or battery company an agreement to maintain his battery on a definite upkeep basis. From all reports this is meeting with favor wherever it has been adopted.

"*Ampere-Hour Meters.*—One of the principal difficulties a few years ago was the fact that the driver had no information as to the state of charge or discharge of his battery. Some trucks were equipped with volt and ammeters, but such delicate instruments were not dependable for truck work and were practically useless.

"The development of the ampere-hour meter has been one of the biggest single items of benefit to the electric vehicle user, as it is reasonably dependable and furnishes the driver with sufficient information to enable him to get maximum work out of his vehicle. It is also of great assistance to the garageman in charging the battery.

"*Tires.*—A few years since, whenever an owner wished to change from one make of tire to another it was necessary to have his wheels changed over to conform to the dimensions required for the particular type of tire to be used. The standard wheel dimensions which have been adopted by the Society of Automobile Engineers have solved this difficulty, and now any make of tire can be applied to the wheels now being furnished, resulting not only in a distinct advantage to the owner, but also enabling the manufacturer to carry in stock a reasonable quantity of wheels which can be used for any make of tire.

"Less than ten years ago the best guarantee on truck tires that could be secured from any tire manufacturer was a life of ninety days, whereas to-day practically all of the standard makers will guarantee tires for electric trucks for 8000 to 10,000 miles over a period of 18 months.

More Efficient Tires

"There has also been a distinct improvement in compounding the rubber used for electric vehicles, enabling us to get from 15 per cent to 25 per cent more mileage on one charge of the battery than was possible with some of the earlier makes of tires.

"An instrument for checking tire efficiency is now in general use, enabling the purchaser to know approximately what he is getting before putting the tire in service and thus avoiding the difficulty of reduced mileage and increased current consumption brought about by inefficient tires.

"*Motors.*—The earlier motors were patterned directly from the street railway motors in use at that time, but, due to the more exacting requirements on account of small gearing and closer limits required, considerable difficulty was experienced with the motors with plain bearings lubricated with grease boxes. The trouble was principally felt on gear-driven trucks, which were in vogue at that time. The wear of the bearings would allow the gears to separate far enough to cause rapid wear and frequent breakage, with the consequent trouble of teeth breaking off and lodging between the gears, bending shafts and doing other damage. With the adoption of ball bearings these troubles were eliminated.

No More Motor Trouble

"I would also call attention in passing to the greatly reduced motor trouble brought about by undercutting the mica in the commutators. In some of the earlier types it was as necessary to sandpaper the commutators daily as it was to charge the battery, the result being very short life to the commutators and brushes, to say nothing of low efficiency and high cost of upkeep. The commutators in the motors that are being produced to-day will probably outlast the truck, and the brushes usually give from two to three years' life.

"*Controllers.*—In the earlier type of controllers in which the circuit was broken at each step it is not surprising that all kinds of mechanical troubles were present. The advent of the continuous torque design, resulting in smooth acceleration, was a big step in advance. This has been further augmented by renewable parts, making repairs to controllers a simple job easily done by the driver and overcoming a frequent cause of tie-up and delay.

"The old type step-by-step controller required as constant attention as the commutators, due to arcing and burning at practically every point. As referred to under the heading of Batteries, controllers are now generally arranged to run the batteries permanently in series instead of making series-parallel combinations.

"*Wiring.*—Along with the improvement in controller design came an improvement in the work of installing the wiring. Practically all manufacturers to-day use conduit throughout, and wiring installed in this way is practically as permanent as any other part of the vehicle and in the rare event of wiring trouble developing it can be easily located and readily remedied.

(*Continued on page* 51)

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A Year of Fulfillment

COMMERCIAL VEHICLE trends as exemplified by the 1917 truck specifications printed in this issue are not so startling as in former years. Following 2 years of record production, it would be surprising to find these trends showing many changes in design, showing an abnormal amount of new models and showing radical changes by motor-truck makers. Filling the demand and getting truck components have been the two problems of the past 2 years. The year just closing has not been so strenuous as regards war orders as was 1915, but domestic business has more than taken up the shortage. The majority of the war orders were filled in 1915 and the early part of 1916, so that for several months not a few truck builders who had a good slice of 1915 war orders have been through with them and have had only domestic trade to handle.

There has been no engineering spotlight in the 1916 truck year, and 1917 trucks will not incorporate new chapters in truck design and engineering, but rather a larger percentage of fulfillment of several movements that have been gaining headway for a year or so. Thus the use of electric starting and lighting equipment has made headway. The consumer has largely been responsible for this. He has had a chance to observe the advantages to a transportation system of electric starting and lighting. In general manufacturers were opposed to fitting any additional devices to engines. They considered every such attachment an additional bid for trouble, adding to complications, giving more for the truck driver to care for and in general viewed the use of the electric starter-lighting unit as an undesirable quantity. They could see no reason why a husky driver could not do all of the motor cranking that was necessary. They could see no reason for electric lighting, as trucks operated generally in the daylight and very generally in lighted zones.

The User's Edict

Time seems to have convinced the truck user that the viewpoint of many makers did not parallel actual conditions. The truck user has found evidence in his ledger that fuel is a considerable item in truck operation. His cost system has told him the percentage of time the truck is idle for loading, unloading and miscellaneous stops. This percentage of time consumes a large percentage of fuel. A starter can largely eliminate this waste. Further: Everything done to conserve the physical strength of the driver is an investment, not an expense. The tired driver abuses the truck and, if the starter will to any extent avoid this, then it should prove a useful factor in the machine. With electric lighting there is every argument in favor of it or some equally efficient system for use on many trucks. The quantity of suburban delivery is increasing each year, the zone served by motor trucks is extending around each city and town; in short, the time is coming when the remotest village in the country will be served in many ways by motor delivery from larger centers. This extended service calls for more night work. Already many lines of service have much necessity for night service, and you cannot have any lighting system too good for a motor truck in suburban service.

Equipment Optional

There will be many truck users who have little if any use to-day for starting and lighting equipment, consequently optional arrangements will have to be used, as to-day. Already not fewer than 118 concerns extend these optional arrangements, and the time is practically at end when every truck concern will have to offer such options. Electric lighting and starting when part of truck equipment must be considered in the investment column and not in the expense column.

If the storage-battery problem as required for such equipment for trucks has not been solved it can be solved and that fairly quickly when the demand compels it. Truck vibration as affecting the battery can be satisfactorily overcome by spring suspensions, several of which are in use. The question of requisite battery charging at slow motor speeds is scarcely an electrical one and is one which manufacturers can overcome. There is really nothing which stands in the way of a satisfactory electrical lighting and starting equipment for motor trucks of all capacities and in practically all services.

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Electric Truck Troubles and Means Taken to Eliminate Them

(*Continued from page* 49)

"*Wheels.*—In the early days the old Sarven wheel was used; but this has been replaced by the artillery type, which is lighter and allows the maintenance man some opportunity of tightening the hubs, which was impossible with the older type.

"*Bearings.*—The use of ball and roller bearings has been universally adopted, making it unnecessary to remove the wheels for frequent greasing, as was the case previously, and at the same time reducing the power required to drive the vehicle.

"*Springs.*—Spring trouble has been practically eliminated by the adoption of alloy steel in place of the old carbon steel wagon springs, and at the same time greatly improved by advanced methods in the art of heat-treatment, which has developed rapidly within the last few years. Trouble has been further reduced by the use of eyes formed at ends of one or two top plates attached by links instead of the old flat form of construction.

"Several schemes are in use to prevent shifting of plates, such as ribbed ends of plates and frequent breakage of plates; center is largely overcome by use of teats or ribs in center instead of hole and center bolt. Rebound clips are also in general use, greatly reducing breakage of top plates.

"Frequent breakage of spring bolts has been eliminated by the use of hardened bolts, and a number of users are bushing the eyes of the springs, still further reducing the wear and consequent trouble.

"*Lights.*—A small item, and still one that has caused the user considerable annoyance, has been the question of keeping the lights always in proper condition. This item is frequently neglected due to the fact that the lights are used such a small percentage of the time. The old Edison base—or, more properly speaking, the medium screw base—has been almost universally used, but has caused trouble on account of the bulbs easily shaking out of the sockets and then rattling around and becoming broken. The usual type of socket has not been generally satisfactory for vehicle work, due to the number of parts which shake loose in service. The small bayonet base lamp, as is being generally used on gasoline passenger cars, is coming into more general use for electrics, but, in the opinion of the writer, is not the proper lamp for truck work, where voltages are so much higher than is current practice on passenger vehicles and the vibration resulting from operation on solid tires is very much more severe.

"I am of the opinion that a lamp using the Ediswan form of bayonet base but of a different size in general use in Europe would be more suitable, at the present time the difficulty being that, although the lamps could readily be procured, there are no sockets of this type on the market.

"*Warning Signals.*—Bells have been most generally used on electric trucks, but are also a small item which has been of considerable cost in keeping in proper repair.

Horns for Electrics

"A number of users are beginning to abandon the bell and use instead mechanical signals, which are lower in first cost and are more dependable. This has not met with general favor, as there seems to be a feeling on the part of some manufacturers as well as users that the bell is a distinctive mark, so to speak, of the electric vehicle and they apparently cling to it as a matter of tradition.

"*Miscellaneous Parts.*—In practically all parts of the vehicle that are subjected to wear manufacturers are now making these renewable so that, instead of the repair man being required to drill and ream worn holes and bush them, the renewable parts are driven out and readily replaced with new ones. Numerous pins, bolts, screws, etc., are being hardened and ground, alloy steel being largely used in gearing and other parts. More attention is being given to parts exposed to grit and dust to prevent its getting in and causing damage.

"In the early part of my paper I touched on the advantages derived from a battery service system. I feel, however, that if such a system is confined to the battery alone the work is only partly done. The user of one or two trucks does not usually have a competent mechanic, and where electric trucks are sold to replace horses they are usually put in the hands of teamsters or others equally lacking in technical knowledge to give the vehicle proper care.

More Than Battery Service

"A number of companies have been experimenting with various forms of service systems, some confining their efforts to battery maintenance or rental, while others are endeavoring to cover not only the battery maintenance, but also chassis, body, tires, including painting and current, as well as storage and washing, and I firmly believe that the adoption of electric trucks for general use will be brought about by the development of something of this kind.

"The company with which I am connected has experimented to some extent in connection with its maintenance department in Philadelphia by using various helps to insure to the customer continued use of his vehicle, with results exceedingly satisfactory to the user as well as to the company.

"The experiment was first tried out by furnishing to the user spare wheels and batteries on a rental basis for such a time as necessary for the user to have his parts repaired. The charge for the for running his own equipment, and has use of these parts has been approximately the same as the cost to the user for running his own equipment, and has resulted in his getting continued service from the complete vehicle.

"During the past year we have experimented still further, entering into contracts with a number of users first to overhaul their trucks and then to maintain the trucks, including furnishing current and garage service for a fixed amount per month, the charge including not only current and garaging, but all work and material necessary to keep the battery up to the proper standard of capacity, making all repairs and replacements to chassis, repairs to body, including an occasional repainting of the vehicle, renewal of tires, and, in fact, every item of expense with the exception of licenses and accident and liability insurance.

"In every case where this has been tried—and I might add that in several cases the user was on the fence as to whether or not to discard electric vehicles—they have become not only satisfied but enthusiastic, and our feeling is that the experiment so far conducted will lead to the adoption of some system of this kind that will be the greatest help toward selling electric vehicles that so far has been developed.

"In a great many cases there are good reasons why it is not satisfactory or feasible for the user to send his truck to a garage every night, and in order to meet this difficulty we have made some experiments with the idea of maintaining the vehicle while stored and the battery charged on the customer's premises, and it is entirely possible that something along this line will be worked out that will entirely relieve the purchaser of any care of the vehicle other than washing the vehicle and having the driver or night watchman posted sufficiently to insert the charging plug in the vehicle after it has completed its day's work. This, to my mind, will eliminate practically all of the objections which are offered at the present time against the operation of electric vehicles, as by this method care of the battery and all parts of the vehicle will be in the hands of experts.

"In order to handle a plant of this kind satisfactorily it will be necessary for either the central station, the manufacturer, the battery company or some combination of the three—or, better still, an entirely disinterested party—to enter into a contract with the central station to purchase current at proper prices. He will, on account of the quantity of work done, be able to secure his battery renewals and other parts reasonably low and, by concentrating his mechanical repairs as well as the battery and other work at a central point where it can be handled economically, be able to furnish this service to the user at attractive prices and there will still be sufficient margin of profit to make the venture attractive.

"A maintenance system of this type will, of course, be of advantage principally to the user of one or two trucks. Owners who operate fleets of trucks are usually sufficiently well equipped to take advantage of numerous economies under the direction of capable men, thus avoiding the troubles which at the present time stand in the way of the small user of electric trucks."

A System of Remote Control for An Electric Testing Laboratory. — In a laboratory in which a large number and variety of electrical instruments are tested, it is important that means be provided for the rapid and accurate control of the electric generators which provide the current for testing. In scientific paper No. 291 by P. G. Agnew, W. H. Stannard, and J. L. Fearing, published by the Bureau of Standards, an elaborate system of this kind which is in use at the bureau, is described. The control rheostats are not handled by the observers directly, but are operated by small motors which are controlled from any one of several laboratory rooms by means of small, multiple lever switches. Copies of this report may be obtained without charge upon application to the Bureau of Standards, Washington, D. C.

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Separate Truck Show in Boston?

Lack of Mechanic's Building Space Starts Plan

BOSTON, MASS., Oct. 16—There is some talk being heard now in Boston about a new plan that would separate the trucks and the cars at the Boston Motor Show and give both more room. The big tabernacle being erected for the Billy Sunday evangelical meetings will be vacated about Jan. 1 and some Bostonians are trying to negotiate a lease of the structure. It was rumored that there would be a possible chance to have all the truck exhibitors use it for a show in March. As it is about ½ mile away, although on the same street as Mechanic's Building, some of the men who handle both trucks and passenger cars might object to going there. There is a possibility that the dealers might lease it for a week to prevent any opposition show being held at Boston in March by those who could not get space at Mechanic's Building. The Boston Automobile Dealers' Assn. has leased Mechanic's Building anyway, so there is no possibility of any transfer of the entire show to the big tabernacle.

NEW ENGLAND TRUCK DRIVERS MUST BE CAREFUL

BOSTON, MASS., Oct. 23—Motor truck drivers operating on the highways from Manchester, N. H., down through eastern Massachusetts to Providence, R. I., who are in a hurry and do not stop when a trolley car is taking on or letting off its passengers, according to law, will find themselves in court or before the Highway Commission in the future. The Bay State Street Railway Co., which operates trolleys through several hundred miles of that territory, finding that some of its passengers have been injured, has ordered all motormen and conductors to take the number of every motor vehicle which does not live up to the law. The circumstances will be reported to the company, and then the officials will determine whether to summon the drivers before the courts or complain to the Highway Commission requesting that licenses be suspended.

NEW BOURNE TRUCK HAS MAGNETIC TRANSMISSION

PHILADELPHIA, PA., Oct. 21—The Bourne Magnetic Truck Co., this city, will soon be ready to deliver 2 and 3½-ton trucks with a magnetic transmission precisely similar in its method of operation to the Owen transmission used on Owen magnetic passenger cars. The chassis built is not entirely a new creation erected around the electric transmission unit. S. N. Bourne has built a small number of special trucks with gear transmission, of which a majority are in the service of the Atlantic Refining Co.

The trucks will be offered in two models. The 2-tonner will cost $3,150 and the 3½-tonner $3,850. The vehicle is completely described on page 58 of this issue.

BOSTON MAY HAVE TRUCK WAREHOUSE

BOSTON, MASS., Oct. 25—A new plan to allow the motor dealers in Boston a chance to warehouse their trucks and passenger cars is under way in that city and it may prove economical for them, but hold up future real estate developments in the way of newer and bigger buildings. Some months ago the great Brighton Abbatoir that fronted on the tracks of the Boston & Albany railroad was burned down. It was a large place and thousands of cattle were herded and slaughtered there weekly because it was on the through line from the West. Some of the railroad officials got an idea that it would be a good site on which to build a big motor warehouse so that when trucks or cars came to Boston and there was not room in the motor buildings instead of hiring vacant space elsewhere, or keeping the cars on the freight trains, they could be warehoused in the new building. So some inquiries were made among dealers, and some of them agreed that they would use it. If the railroad officials can get enough dealers to go into the plan for a big warehouse the road will build one, but it insists on contracts first before going ahead. The location in Brighton is not very far from Alvan T. Fuller's big Packard plant, so it is not far out, being in the city limits of Boston. From the plant it would take but a few minutes to reach Commonwealth Avenue.

Meanwhile some men who have developed property in the Fenway and Back Bay districts have been planning on erecting such a warehouse in the midst of the motor section, near Commonwealth and Brookline Avenues. If the railroad goes ahead with its project the other will not be undertaken. From time to time dealers have outgrown their buildings so they have to hire space from other dealers who have cleaned up their stocks, and it is figured that the warehousing would be less closely. The railroad has the advantage, for vehicles can be shipped direct over its lines to the warehouse.

Coming Commercial Vehicle Events

Nov. 14	New York City, Monthly Meeting of the Motor Truck Club of America, Automobile Club of America, 247 West Fifty-fourth Street.
Nov. 15	Newark, N. J., Monthly Meeting of the Motor Truck Club of New Jersey, New Jersey Automobile Club, 22 Washington Place.
Nov. 10-18	Providence, R. I., Annual Motor Vehicle Show.
1917	
Jan. 13-20	Montreal, Que., Can., Montreal Motor Show.
Feb.	Newark, N. J., Passenger Car and Motor Truck Show, First Regiment Armory.
Feb. 3-10	Minneapolis, Minn., Tenth Annual Auto Show.
March 3-10	Boston, Mass., Fifteenth Annual Motor Vehicle Show, Mechanics' Building.

United Holding Firm Being Formed

New Concern May Also Control Other Truck Companies

DETROIT, Oct. 24—Organization of a holding company in New York to be known as the United Truck and Equipment Co., with incorporation in Michigan to operate the United Motor Truck Co., is being perfected. Other companies may be controlled by the holding company.

NEW OVERLAND DELIVERY CAR

TOLEDO, OHIO, Oct. 16—The Willys-Overland Co. has put on the market the new Overland 75-B chassis fitted with a panel delivery body, selling at $625 f.o.b. Toledo. Features of the chassis which are not commonly found in low-priced delivery cars are the four-cylinder 31½-hp. block engine, electric starting and lighting system and 31 by 4 in. tires.

The panel delivery body fitted provides more than 78 cu. ft. of loading space back of the car. As the driver's seat extends only half way across the car there is additional space available extending to the toe board if required, the entire length of the floor on that side of the car being 97 in. The car is light and compactly built, has a short turning radius, making it easy to handle under all sorts of traffic conditions, and is designed to be economical in operation and maintenance.

LIMIT STRAIGHT-SIDE SIZES

WASHINGTON, D. C., Oct. 20—Straight-sided tires, larger than 36 by 4½ in., are not practical, and straight-side tires smaller than 32 by 3½ in. are unnecessary as smaller ones are for Fords and therefore are the soft-bead clinchers. It was also agreed that the straight-sided tire be understood as the wide-standard type. This fact was brought out at the meeting of the standards committee of the Society of Automobile Engineers at the Bureau of Standards Wednesday, at which several new standards were adopted by the committee for presentation to the society for mail vote. The tire division recommended straight-side tires from 32 by 3½ in. to the 36 by 4½ and the recommendation was adopted.

CHASE SPEAKS AT PENN. S. A. E.

PHILADELPHIA, PA., Oct. 14—The first meeting of the Pennsylvania Section for the season of 1916-17 was held at the Engineers' Club, 1317 Spruce Street, Philadelphia, on Thursday evening, Oct. 26. The paper of the evening was presented by Herbert Chase, chief engineer of the electrical testing laboratories, Automobile Club of America, and treasurer of the Society of Automobile Engineers. Mr. Chase spoke on the subject of "The Otto Cycle versus Constant Pressure Cycle, for Automobile Engines."

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White Net Profits Over 1½ Millions

Income 2¾ Millions in 6 Months Ending June, 1916

NEW YORK, Oct. 21—The White Motor Co., Cleveland, Ohio, reports a surplus of $1,623,521, which is equivalent to 11 per cent on the $16,000,000 capital stock. Net profits from operations were $2,635,784 during the 6 months ending June 30, 1916. Adding $115,208 in other income, brings the total income to $2,750,923. The expenses of the company amounted to $847,472 and the dividends up to the March 31 quarter to $280,000, thus bringing the surplus to $1,623,521.

The company has $16,000,000 capital stock, $50 par value, with no bonds and no preferred stock. The company is paying 7 per cent dividends on the stock. Net profits in the year 1915 were approximately $8,700,000, over 54 per cent on the stock.

The White company has been running at maximum capacity for 2 years without any cessation of double-shift schedule.

SELDEN SALES GAIN 258%

ROCHESTER, N. Y., Oct. 14—An increase of 258 per cent was made by the Selden Truck Sales Co., this city, in the period of 8 months, extending from Jan. 1 to Aug. 31. September shipments of 1916 increased 121 per cent over the same month in 1915.

BROWN-LIPE-CHAPIN JOINS UNITED MOTORS

NEW YORK, Oct. 24—The Brown-Lipe-Chapin Co., Syracuse, N. Y., the largest manufacturers of motor vehicle differentials and gears in the world, has become associated with the United Motors Corp.

The Brown-Lipe-Chapin Co., as is the case with each unit of the parent corporation, will retain its name, its management and its general policy. H. W. Chapin will continue as general manager and those who have been with him in the successful operation of the business will remain.

TAKES ROYAL EQUIPMENT

NEW YORK CITY, Oct. 24—Special telegram—The Raybestos Co. has been incorporated with $1,500,000 capital to take over the Royal Equipment Co. There will be no change in policy or products. A 15-acre factory site has been purchased in Bridgeport and six new buildings will be erected, doubling the capacity.

NEW GASOLINE INDUSTRIAL TRUCK

MILWAUKEE, WIS., Oct. 23—The Milwaukee Locomotive Mfg. Co., pioneer builder of gasoline locomotives, is placing on the market a new type of gasoline tractor. It is somewhat similar in appearance and uses to the electric industrial trucks at present in use by various large railroads. It is intended for the handling of freight at railway terminals, steamship docks and freight houses. Power is supplied by a four-cylinder, vertical, block engine with a bore and stroke of 3¾ and 4½ in., power being transmitted through a bevel gear differential and external-gear-driven axle. The truck will transport 4000 lb. on its platform and will haul a trailer load of 3½ tons.

The truck is described in full on page 58 of this issue.

S. A. E. ANNUAL DINNER JAN. 11

NEW YORK CITY, Oct. 22—The annual dinner of the Society of Automobile Engineers will be held Jan. 11 in this city in the Grand Ballroom, top floor, of the Hotel Biltmore.

A reception of members will begin at 6.30 and continue to 7.30, the hour of the dinner. Tickets are $6 each.

KELLY TRUCK CAPITAL $7,000,000

COLUMBUS, OHIO, Oct. 20—The Kelly-Springfield Motor Truck Co. has filed papers with the Secretary of State increasing its stock from $1,740,000 to $7,000,000. The shareholders have ratified the increase. The shares will be divided as follows: Common, $2,000,000, against $900,000, formerly; preferred, $5,000,000, compared with $840,000.

MOTOR TRUCKS MAKE DESERT RAMBLE

DETROIT, Oct. 21—Motor trucks in southern California began a ramble out of Los Angeles this morning with many Detroit-made trucks in the starting line. The trip is promoted by the Motor Truck Dealers' Assn., and is under the sanction of the American Automobile Assn. It will last 2 days and will cover a course over the desert which has given the tour the name of the Desert Ramble.

NEW POLACK ORGANIZATION

NEW YORK CITY, Oct. 14—The Polack Truck Tyre Corp. has been organized to take over the assets and business of the Polack Tyre & Rubber Co., Bridgeport, maker of solid rubber tires for commercial vehicles.

The new company is offering through E. B. Eames & Co., this city, 40,000 shares of stock at $12.50 per share out of a total capitalization of the company of 100,000 shares, no par value.

The refinancing plan provides the funds for the erection of a new plant. It is estimated that when the new plant is completed the company will earn about $3.50 a share.

Packard Shows Surplus of $10,823,717

Assets Increase 11 Millions and Profits 6 in Last Year

DETROIT, MICH., Oct. 20—Packard assets have increased $11,830,505 during the past year. More than $6,000,000 has been added to the surplus, and a general prosperous business growth is displayed in the consolidated balance sheet for the fiscal year ending Aug. 31, which was submitted to stockholders of the Packard Motor Car Co. at their annual meeting in the company's general offices Thursday, Oct. 19. The report presents the company's financial statement and several paragraphs of explanation, among which it is stated that plant values amounting to $1,250,000 were written off in excess of regular depreciation, making the total depreciation written off the Detroit plant, $2,847,648.76 for the fiscal period.

The consolidated sheet of the Detroit and subsidiary companies shows $6,206,419.61 added to surplus for the year and an increase of $9,094,388.88 in value of inventories comprising raw material, work in progress and finished vehicles. The increase in inventories, it is explained, was not as great as the company's increase in vehicle production which was 186 per cent greater than in the preceding year.

During the year the company's authorized capital stock was increased from $16,000,000 to $21,000,000 by the addition of $5,000,000 par value of common stock, and the issued capital stock was increased from $7,065,300 of common and $5,000,000 of 7 per cent cumulative preferred stock to $11,656,930 of the authorized $13,000,000 of common stock and to the total $8,000,000 of authorized preferred stock. Of the new stock issued, $4,591,630 of common stock was put out in the form of stock dividends. Proceeds from the sale of the $3,000,000 of preferred stock issued during the year provided part of the increase in working capital necessitated by the company's large expansion in business and enlargement of plant facilities.

The liabilities include $3,000,000 of 5 per cent gold debenture notes due Dec. 1, 1916. Since the close of the fiscal year arrangements have been completed for retirement of these notes and the acquisition of $2,000,000 additional working capital through the sale of $5,000,000 of 5 per cent gold notes to William A. Reid & Co., New York bankers. The new notes will be dated Oct. 15, 1916, and will be due Oct. 15, 1919.

Though no statement of the company's gross sales has been included in the report, the total for the year is said to have been $35,000,000. Officers and directors were re-elected in the annual meeting and in the directors' meeting which followed it.

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Truck Club Talks Proposed Restrictions and Steel-tire Street Damage

Will Vigorously Protest New Jersey's Proposals—Steel Trailer Tires Should Be Wide

NEW YORK CITY, Oct. 18—The effect of motor trucks on present-day street pavements and a discussion of the proposed ridiculous legislation affecting motor truck use in the State of New Jersey were the important subjects taken up at the first fall meeting of the Motor Truck Club of America, held to-night at the Automobile Club of America.

Eugene W. Stern, engineer of the Bureau of Highways, Borough of Manhattan, New York City, was the speaker of the evening, and delivered a short illustrated address on the necessity of limiting the loads, speeds and sizes of vehicles in order to preserve the present city thoroughfares. In this connection he did not discuss the effect of the use of conventional four-wheeled trucks, but took as his theme the tractor and trailer equipment of Jacob Fradus, a contractor hauling excavated material from the New York subways. This equipment and its method of operation were described fully in the Feb. 1, 1916, issue of THE COMMERCIAL VEHICLE.

The Fradus vehicles consist of 15-ton tractor-and-trailer units, the rear wheels of the trailers being shod with steel tires 8½ in. wide. It was Mr. Stern's contention that the load per inch of tire width on these tires was approximately 1400 lb., or 600 lb. in excess of the limit of 800 lb. as laid down in New York State statutes. Mr. Stern then claimed that these vehicles had done immeasurable damage to the streets over which they run, and presented facts, figures and lantern slides to prove his contention.

He gave figures to show that the sheet-asphalt and granite-block pavements over which the Fradus vehicles run were all approximately 4 years old, and stated that before the operation of the steel-tired trailers the pavements had shown no appreciable amount of wear beyond what ordinarily might be expected on thoroughfares with as much traffic as the streets mentioned.

He then stated that the amount of repairs which had been necessary on the asphalt streets of the routes covered since the operation of the vehicles 9 months ago had amounted to 1900 sq. yd., equal to 30 per cent of the total area, costing $1,900. Prior to this time, he said, the annual cost of repair had been $70. The granite-block streets which had been traversed had to have 5400 sq. yd. of repairs made to them during the 9-month period, at a cost of $6,000. Prior to this the average cost of maintenance had been $150 per year.

He also gave figures for the percentage of repairs based on the total areas of the granite pavements on the route traversed, as follows:

Location	Percentage of Repairs 1915	9 mo., 1916
Forty-second Street, Ninth to Tenth Avenues	0.4	45.0
Tenth Avenue, Forty-second to Fiftieth Street	0.5	26.0
Fiftieth Street, Eleventh to Twelfth Avenue	0.6	36.0

The effect of the trailer use, as indicated in the lantern slides shown, included breaks in the wearing surface, waves, ruts and shoves. In some cases the 6-in. concrete base has been shattered, according to Mr. Stern. On the granite pavements many of the blocks have been cracked or crushed.

According to the evidence submitted, the Fradus trailers have apparently damaged the pavements to a considerable extent. The solution of this problem is wider steel tires. There is no reason why 12- or 14-in. tires could not be fitted just as easily as 8½-in. sizes. This would result in the vehicles causing no more damage than other smaller ones. Because this particular equipment has damaged the pavements is no reason why the limits of loads of all vehicles should be restricted.

In fact, the progress of road transportation has been toward larger loads, as these decrease the number of vehicles on the streets and therefore the congestion.

It was further pointed out by G. W. Greene, chief engineer of the Fifth Avenue Coach Co., which operates more than 100 buses, that street pavements should be built up to the traffic instead of the vehicles down to the roads. In answer to this statement, Mr. Stern stated that it was not his intention to hamper motor traffic unnecessarily, but that until such time as better roads could be built those now in existence should be protected and conserved as much as possible in justice to the taxpayer who has paid the bill.

In the matter of better roads, Mr. Stern pointed out later that his experience had taught him that concrete roads could be built with an assumed surface wear of 20 years and then as a foundation for another surface material, and that under these assumptions they were more economical than any other type.

In regard to the matter of the proposed motor truck restrictions in the State of New Jersey, which were given in full in the Oct. 15, 1916, issue of THE COMMERCIAL VEHICLE, Charles G. Bond, counsel for the club, presented a report on the protest which he made before the first hearing held in Newark on Oct. 2.

In brief, the proposed restrictions include: 23 ft. 6 in. maximum truck lengths; rubber-tired trailer wheels in all cases; use of way bills for each load to show its amount; the carrying of an extra tire and wheel on each truck; the use of governors on all trucks, and a substantial increase in registration fees ranging from the present maximum of $25 to $125.

In a discussion of these proposed measures it was brought out that no distinction was made between light delivery vehicles and heavy trucks in regard to governors, and that lighter trucks would be seriously handicapped were it necessary for them to reduce their speeds according to the proposed schedule in which the maximum rate of speed was set at 20 m.p.h. The question of rubber tires on semi-trailers was also objected to by many of the users present, as were also the length restrictions and the registration fees. All of the objections will be included in a brief to be presented before the New Jersey authorities at the next hearing of the bill.

1565 TRUCKS EXPORTED IN AUGUST

WASHINGTON, D. C., Oct. 21—Commercial vehicle exports in August, 1916, numbered 1565, valued at $4,442,158, as compared with 1614 in the corresponding month in 1915, valued at $4,387,193, and with 1243 in July, 1916, valued at $3,062,670.

The exports of commercial vehicles in the 8 months ending August dropped from 15,042, valued at $41,886,961 in 1915, to 12,938 trucks, valued at $35,167,840 in the same period in 1916.

TO RELIEVE CAR SHORTAGE

DETROIT, Oct. 23—Railroads are becoming active in their appeals to shippers to aid in abating freight car shortage which is now causing many car manufacturers to cut down production. Paul King, receiver for the Pere Marquette, has pointed out to shippers that the only immediate remedy lies in prompt loading and unloading of cars. Mr. King attributes the shortage to the great volume of freight and declares that this has forced a number of embargoes.

Resolutions were passed at a lumbermen's convention in Memphis on Oct. 21 which favored adoption of the proposed increased demurrage charges as recently announced by railroads and a reciprocal arrangement was demanded by which railroads would be penalized for failure to provide freight cars as requisitioned.

BAY STATE GUBERNATORIAL CANDIDATE PROMISES MOTOR AID

BOSTON, MASS., Oct. 26—If Hon. Frederick W. Mansfield, ex-State Treasurer, is elected Governor of Massachusetts there will be no more holding up of the motor industry to secure extra revenue through increased fees on trucks and passenger cars, he told the members of the Bay State A. A. at noonday luncheon yesterday. He said he would advocate a motor vehicle commission to handle the motor business properly instead of having the Highway Commission try to do it when it had not the time.

In the past the motorists have had to fight every inch of the way to prevent hostile legislation, particularly against high truck fees which a Republican legislature tried to fasten onto the motor industry.

RUSSIA NEEDS TRUCKS

PETROGRAD, RUSSIA, Oct. 19—Lack of proper transportation for food and grain in this country has forced the cost of

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living from 200 to 600 per cent since the outbreak of war. All the larger Russian cities are under military restrictions concerning the supply of food. In Petrograd at the present time there are restrictions on meat as well as on many other articles of food. One is allowed to have meat 3 days a week—Saturdays, Sundays and Mondays. It is impossible to buy meat on other days and it is then sold only in quantities of so much for each individual in the family.

Everything has advanced in price since the war began. Not only does this app. to foodstuffs, but it also affects clothing, tobacco and many other things. The reason for all of these high prices reverts back directly to the matter of transportation, as Russia has plenty of food and grain, but no way of transporting it. American motor trucks are being used in great number to offset the lack of railway transportation.

SMALL TRUCK POPULAR IN COLUMBUS

COLUMBUS, OHIO, Oct. 26—A thorough canvass of the motor truck situation in Columbus and central Ohio reveals the fact that the small truck, varying from 750 to 1500 lb. carrying capacity is the most popular type of commercial vehicle in demand. Practically all of the truck dealers in the Buckeye capital report a large increase in the calls for the small trucks and are urging their factories to supply the demand as promptly as possible.

In cases where the corporation or firm invested in larger trucks at the start they are now buying smaller trucks and are splitting their loads. By that means they are able to give better service to their customers, without any great increase in the expense. The first cost is not a great deal more and the extra cost of drivers is easily made up by more satisfactory service.

NEW ZEALAND TO BUILD CONCRETE ROADS

AUCKLAND, NEW ZEALAND, Oct. 21—The authorities of New Zealand propose to adopt concrete as a road building material. The American Consul General at Auckland reports to the State Department that the local and national authorities in New Zealand are studying the subject of good roads, realizing that these are essential to development of the remoter parts of the dominion. Upkeep of the stone roads has been found very expensive and the construction of concrete roads, as carried on in some parts of the United States, is being studied carefully, with the result that it is proposed to adopt some of these methods.

The New Zealand authorities estimate that a mile of 12-ft. concrete road could be built for $2,000 more than a mile of ordinary stone road, and that there would be a saving in upkeep of at least $1,200 a mile in the first 5 years, while at the end of 10 years there would be a saving of $7,000 or $8,000.

A good grade of cement is being manufactured in New Zealand that is suitable for concrete road building, and as there are no severe frosts in the country, it is proposed to make the roads 4 inches thick as in California.

Bay State Motor Trucks Doubled in 2 Years—17,026 Now in Use

More Than 5,000 Trucks Were Registered in the First 9 Months of the Present Year

BOSTON, MASS., Oct. 20—Figures covering nearly the past 2 years in Massachusetts show that the commercial vehicles have more than doubled in that time.

There were 8236 trucks registered in 1914, and now in less than 2 years there is a gain of more than 100 per cent, for the figures show 17,026, or 554 more than double the 1914 registrations. The year gain of 1915 over 1914 showed a gain for the trucks of 3744, or less than 50 per cent, so that it was the 5066 new additions for the first 9 months of this year that brought the total above the 100 per cent. The figures are as follows:

Registrations of Motor Trucks in Massachusetts, Showing Gains in a Period of Nearly 2 Years

Entire year 1914	8,236
To Oct. 1, 1915	11,150
Entire year 1915	11,960
To Oct. 1, 1916	17,026
Nine months' gain	2,914
One year gain	3,744
Twenty-one months' gain	8,790

Delivery Conference in January

Department Store Executives to Discuss Trucks

NEW YORK CITY, Oct. 30—*Special to* THE COMMERCIAL VEHICLE—Commercial vehicles, their methods of use, their costs and their relation to the problem of excessive delivery costs which now faces the retail dry goods business will be discussed by leading department store executives from all parts of this country, Canada and possibly other countries at a great delivery conference slated to occur in New York next January.

The conference is to be conducted by *The Dry Goods Economist* of New York, the national authority on dry goods matters, in co-operation with THE COMMERCIAL VEHICLE.

Means of increasing delivery efficiency and decreasing delivery cost by means of the proper use of motor vehicles and a plan for co-ordinating and standardizing operating cost and performance records for mutual benefit will be the principal topics for discussion. The date has not as yet been determined, although work on the program is now progressing.

GOTHAM BUSES EARN $1,669,726

NEW YORK CITY, Oct. 24—The Fifth Avenue Coach Co., this city, during its fiscal year, ending June 30 last, carried 16,223,042 passengers at 10 cents each, in its 132 buses, its revenue from this source amounting to $1,622,304.20, an increase of $217,257.10 over the previous period's operations. The company made 33.10 cents per active bus mile. Revenue from livery service, 19,460 bus miles, amounted to $16,281.66 and advertising privileges netted $31,140.32, thus bringing the total revenue from operations to $1,669,726.18, an increase of $218,218.08 over the previous period. After deducting total operating expenses of $1,064,690.36, the income was $458,672.90, $94,498.70 more than last year.

A feature brought out in the report of the company is that the 132 buses ran at a cost of only 21 cents per bus mile, each bus using six tires, the rear wheels each having two tires. This is based on a mileage of 4,966,995 and a total operating expense of $1,064,690.36. New tires during 1916 cost $54,533.63.

NEW YORK REGISTERS 32,942 TRUCKS

ALBANY, N. Y., Oct. 22—For the first time in the history of this or any other State in this country the registration in New York State has exceeded the 300,000 mark, exactly 303,223 trucks and passenger cars and 98,203 persons having been licensed to date. Of this number 32,942 are commercial vehicles.

HEXTER LEAVES REPUBLIC

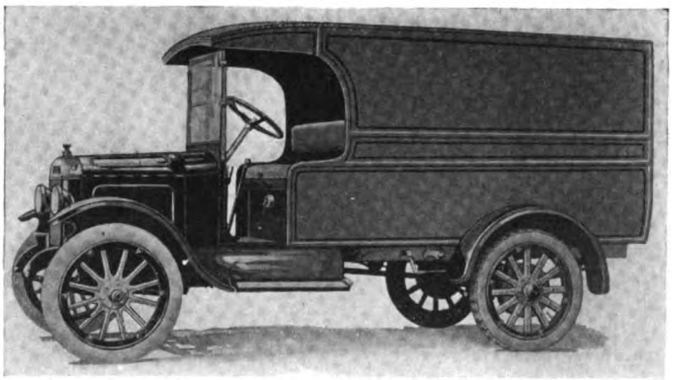
NEW YORK CITY, Oct. 30—P. K. Hexter, who has represented the Republic Motor Truck Co., Alma, Mich., as eastern sales manager for the past 2 years, severs his connection with that company on Nov. 9. Mr. Hexter has been instrumental in placing and building up the successful agencies selling Republic trucks in the territory he controlled. His future plans are not known as yet.

MOTOR TRUCK BATTLE FLAG

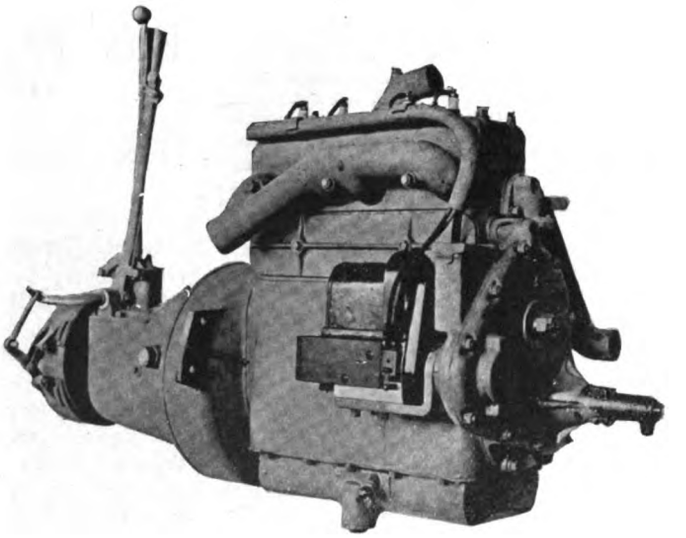
KENOSHA, WIS., Oct. 24—What is probably the first battle flag ever designed and used by a motor truck company in the United States Army is now being proudly displayed in the Nash factory. Members of truck company, No. 1, U. S. A., which consists of Jeffery Quads, sent the emblem to H. C. Hart, truck sales manager of the Nash organization.

In each corner of the flag there is either a pair of crossed American flags or a spread eagle, while across a blue circle on a red background appear the words Jeffery Quad in white lettering. Truck Co. No. 1 is inscribed over the circle, and U. S. A. beneath it.

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Side view of ¾-ton Republic model with panel body



Unique motor applied to new Republic

New Light Republic Features Unique Motor Design

Electric Lighting Stock—Starting Optional

REMARKABLE simplicity characterizes the new 1500-lb. Republic model for which the Republic Motor Truck Co., Alma, Mich., has built a special factory, planning to produce 10,000 in 1917. It is a typically Republic design, having internal-gear drive, with spring torque and propulsion, the Republic cowl dash and a cast-case radiator of the same general shape as the older models.

One of the first models of this chassis to be built has been sent on a demonstration run from Alma to Los Angeles, Cal.

Although the chassis is regularly mounted on pneumatics, for fast delivery work, it is designed to operate satisfactorily on solids. Unit construction has been carried far, the engine, clutch, gearset and hand brake being one inclosed unit suspended from the frame on three points. The entire electric system is a single unit Bosch magneto-generator, supplying ignition on the single plan and electric lighting.

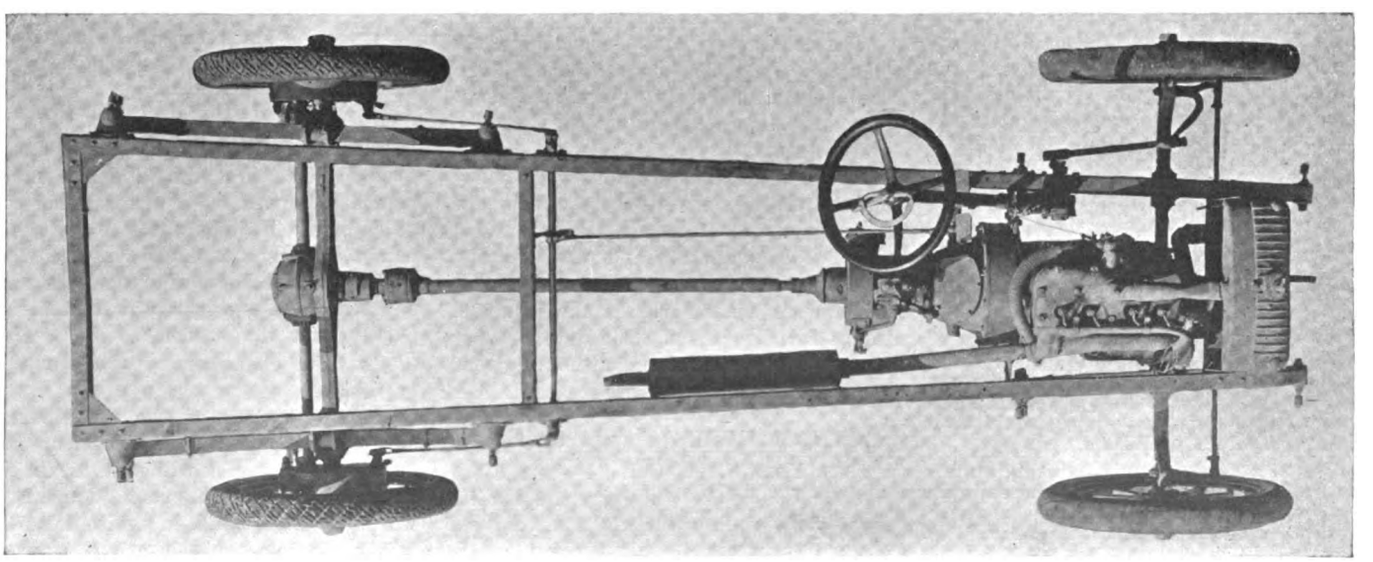
Detailed specifications of this model will be found on page 34 of this issue. It sells for $750 in the chassis, equipped with either 32 by 4 pneumatics, non-skid in the rear; 32 by 3 front and 32 by 3½ rear solids, or the same sizes cushion. A number of standard bodies, including the panel type shown on this page and an express type with a canopy top, will be furnished.

The engine is of Republic design and manufacture and is a four-cylinder block type. It has a removable cylinder head and an integrally-cast inlet manifold, valves being to the right. Cooling is effected by thermo-syphon circulation, for which large-diameter pipes have been provided with a good height of radiator. The radiator casing is cast iron with a square-tubular core. Shallow fins at the top of the tank assist the radiation and give a sturdy truck-like appearance.

Like all Republics, the new model uses the Ruggles gas-velocity governor in its manifold. This governor comprises a simple spring-retained poppet valve which closes upon a pre-determined intensity of suction, thus preventing the gas reaching a velocity which might result in excessive motor speed. It is adjustable to give any desired speed, at which adjustment it may be locked or sealed. At the factory it is set and sealed at 1050 r.p.m., corresponding to 20 m.p.h.

The carbureter is bolted to the cylinder block through the medium of a manifold containing this governor and is fed by gravity from the fuel tank located in the dash.

The Bosch magneto-generator is located to the right, driven by a third gear in the timing gearcase through an ingenius coupling which permits the timing of the spark to be effected without removing the magneto or the driving



Top view of Republic Dispatch model, showing extreme simplicity

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gear. It consists substantially of a high-tension magneto mounted above a magneto generator, the two machines being quite separate and functioning independently save for the mutual driving connection. The ignition end of the outfit supplies a fixed spark on the single plan and the lighting end, direct current for lighting and charging at 6 volts. At extra charge a starting motor, for which provision is made on the left side of the engine, will be applied.

The engine has a bore and stroke of 3½ by 5, yielding 16.92 hp. by formula. The cylinder casting is of extraordinary simplicity, the crankcase and cylinder block being one casting roughly oblong in form with a removable cylinder head and oil reservoir. The lubrication scheme involves the use of a plunger pump driven from the camshaft which raises the oil through the hollow pump plunger to the valve-spring inclosure. This pocket is closed by the usual form of cover-plate held in place by two bolts, but gasketed at its edges. This floods the tappets with oil and feeds the oil to the crankshaft bearings, timing gears and camshaft. There are but two crankshaft bearings, these being of the annular ball type and the crankshaft short and stiff.

The clutch is of the dry-disk type, driving a three-speed selective gearset. Just back of the gearset is the external hand brake, actuated directly by a bell-crank extension of the hand lever. The rear axle is a Torbensen with internal brakes. The frame is of pressed steel of very simple construction with tapering straight side-members and is flexible.

Hoover ¾-Tonner, a New Make, Has Unusual Location of Tank

Increases Body Space and Is More Convenient

RESULTING from several years of experience in the building of bodies for commercial vehicles and protracted experimentation with chassis, the Hoover truck has just been brought out by the Hoover Wagon Co., York, Pa. It is of ¾-ton capacity of conventional design except for some minor features.

One of these is the fuel system, the tank being located at the right side of the chassis, under the floor, feeding by the Carter vacuum system to the carbureter, high on the side of the engine. The filler cap is rendered very accessible by this construction, being directly in front of the driver, where it may be removed without leaving the seat. A gauge is placed in front of the filler cap where it is at all times visible to the driver, a feature which has not been given the attention heretofore which it seems it merits.

This construction, by permitting the carbureter to be mounted high facilitates starting and the economical use of present low grades of gasoline. Further starting aid is afforded by the starting switch which is integral with the coil, giving a continuous starting spark.

Electric starting and lighting are available on this model if desired.

The engine is block-cast, cooled by thermo-syphon circulation through a cellular radiator of distinctive shape. Ignition is supplied by a high-tension magneto with hand adjustable spark advance. The clutch is a dry-plate type having three plates, driving a conventional three-speed selective gearset. Final drive is by a shaft with two universals to the worm-driven semi-floating axle, torque and propulsion being taken by the springs.

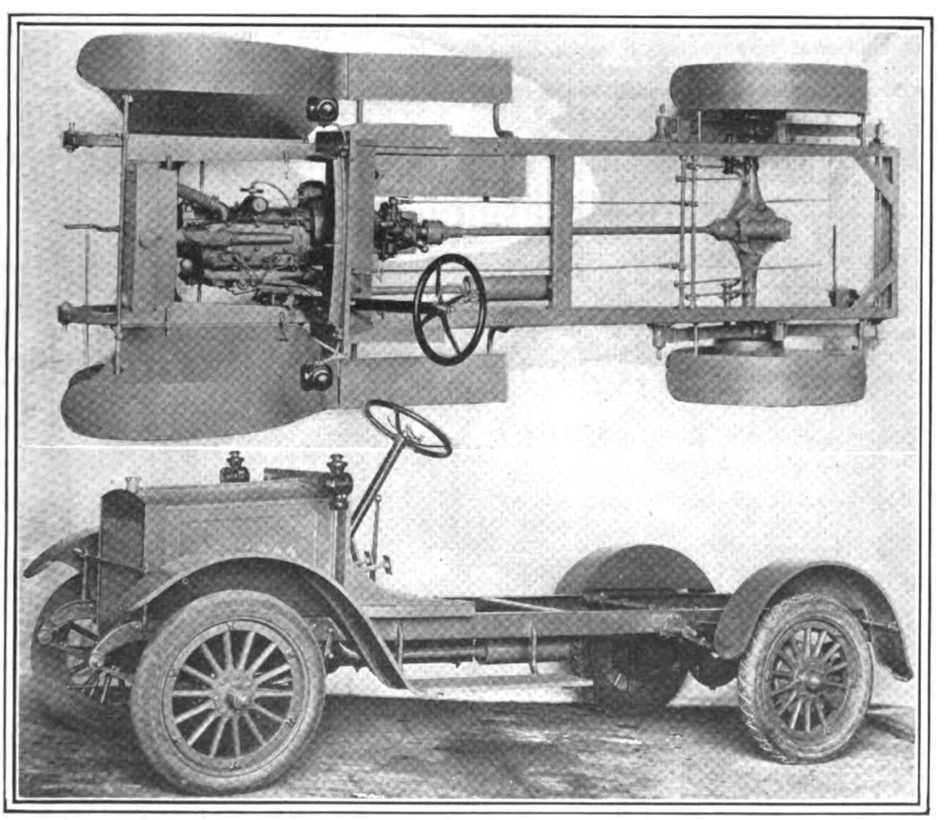
The frame is wedge-shaped, of pressed steel and the springs are of exceptional length and width for this capacity of truck, being 52 in. by 2½ in the rear and 40 by 2 in the front. Both brakes are located on the rear wheel drums.

Fenders and other sheet-metal wood show great pains have been taken, the braces for the fenders being of stout tubular construction designed more for strength than appearance and adequate splash-guards have been fitted between the fenders and the frame.

The concern is in an especially advantageous position to supply special body designs, besides its standard types, since it operates a body business and through the special location of the fuel tank, the space beneath the driver's seat is available for load. The helper's seat may also be omitted, if need be, or arranged to fold.

SPECIFICATIONS

Capacity, pounds	1,500
Wheelbase	120
Tires, front	32 x 4
" rear	33 x 4½
Bore	3¾
Stroke	4½
N. A. C. C. hp.	22.50
Final drive	worm

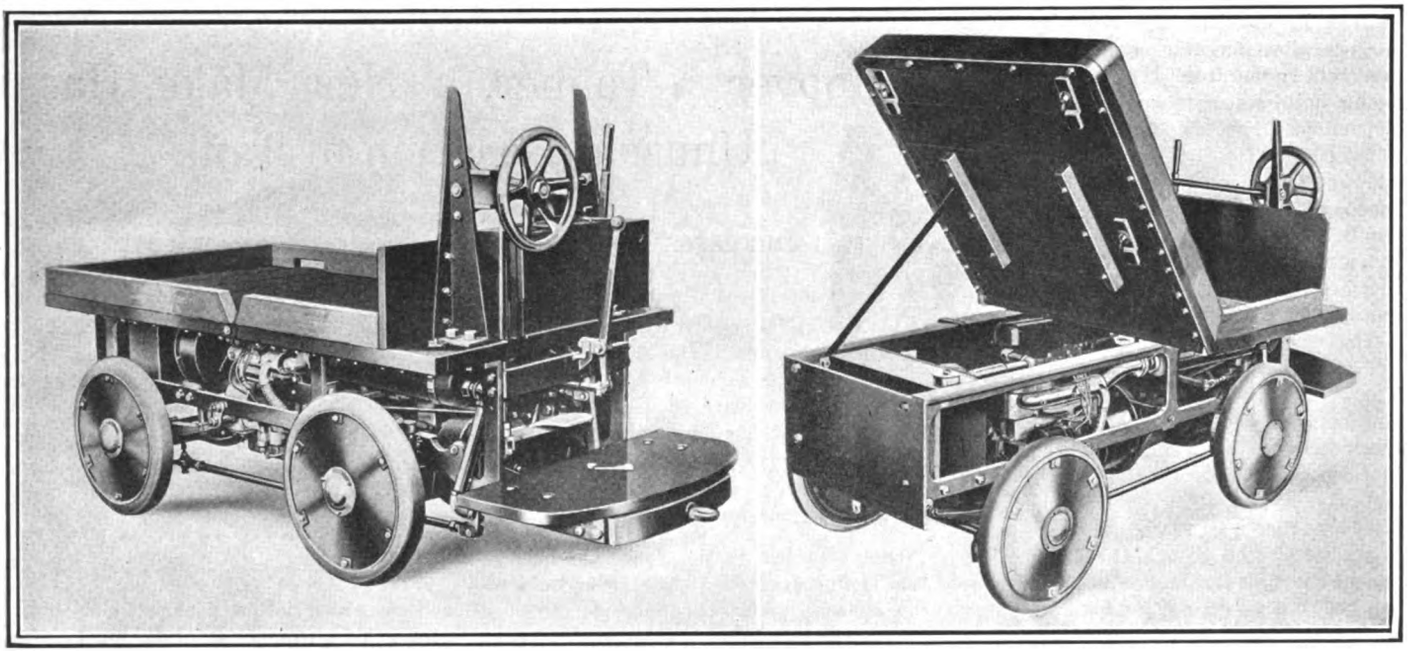


Overhead and chassis views of new Hoover 1,500-pound delivery chassis

Briscoe 1,000 Pounder $675

The Briscoe 1,000-pound delivery vehicle made by the Briscoe Motor Corp., Jackson, Mich., and described in THE COMMERCIAL VEHICLE of October 1 as selling for $695 complete with panel body, is really sold for $675.

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Views of the Milwaukee industrial truck showing accessibility of powerplant with floor raised and standard industrial truck controls

New Milwaukee Industrial Truck is Run by Gasoline Engine

Arrangement and Control Like Electric Stevedore

INDUSTRIAL trucks of a type similar to the electric stevedore but propelled by a gasoline engine instead, have just been brought out by the Milwaukee Locomotive Mfg. Co., Milwaukee, Wis. A casual glance at the machine might deceive one into believing it was of the familiar electric type, as the same arrangement of controls, the same sort of load platform and the same low wheels are found, but a closer inspection shows the engine to occupy the position under the floor occupied by the battery in the other type.

The Milwaukee company is a pioneer builder of gasoline railroad locomotives and is therefore not new to the problems involved in adapting gasoline power to industrial transportation. The vehicle is designed for the identical uses to which electric industrials are applied, such as freight terminal work, dock work, baggage work at passenger stations and for use in factories and warehouses. Besides being provided with a load platform itself, it also is arranged to act as a towing vehicle for trailer trucks.

Its capacity is 2 tons, in addition to which it can trail a gross load of 3½ tons. The engine is equipped with an electric starter and has three speeds forward and one reverse. It uses a conventional four-cylinder block motor, bevel-gear differential and external-gear final drive. A multiple-disk-in-oil clutch and three-speed selective gearset are employed, the assembly forming a unit powerplant. It is water-cooled by centrifugal pump circulation.

The chassis lay-out is surprisingly like a conventional motor truck except as to size. The engine, 3¾ by 4¼, is placed just back of the I-beam Ackerman-type axle with the radiator in front of it. The clutch and gearset are bolted to the engine and the whole powerplant is suspended from three points. A shaft with two universals transmits the drive to the differential, from which it is conducted to the wheels by a jackshaft bolted to the rear axle and driving by external gears. The frame is of the open bar type of cast steel and is above the axles, suspended on four semi-elliptic springs, Hotchkiss drive being used.

The gasoline tank is under the floor at the right side, where it is sufficiently high to feed the carbureter by gravity. A sheet-metal guard protects the radiator in front and the whole mechanism is concealed and protected by a sheet-metal inclosure.

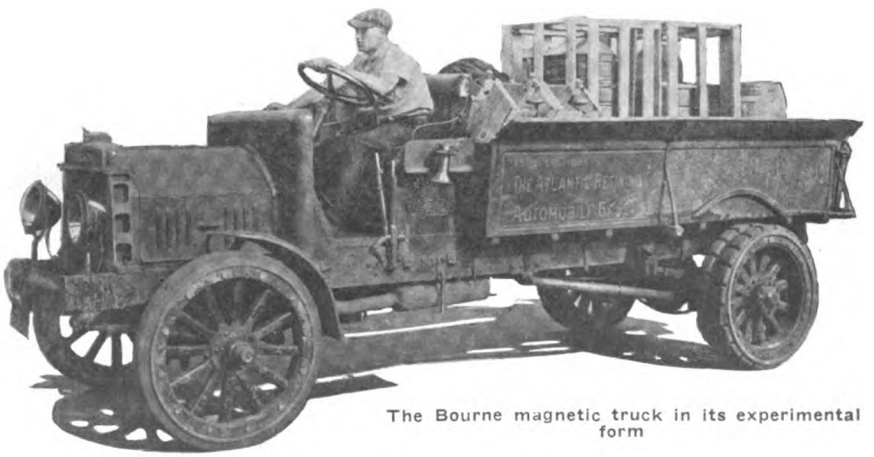
Over the top of the chassis is the loading platform, 31 in. from the ground, 48 in. wide and 78 in. long. At the rear of the platform is the dash, behind which is the operator's platform, close to the ground. The platform is hinged at the back and when raised exposes the entire powerplant and transmission.

Control is effected by a steering wheel on a horizontal shaft, a clutch and brake pedal and two levers. The gearshift lever is of the conventional type with a ball top. The hand brake lever is not retained by a ratchet since the foot brake is normally applied by a strong spring. The clutch is engaged by pressing on the pedal and released and the brake applied by taking the foot from the pedal, this providing the same safety which is found in the electric type.

The wheels are of the steel disk type provided with standard-sized industrial truck solid tires.

Bourne Magnetic Truck Uses Entz System of Electro-Mechanical Transmission

THE Bourne Magnetic Truck Co., Philadelphia, Pa., will soon be ready to deliver 2-ton and 3½-ton trucks with a magnetic drive precisely similar in its method of operation to the Entz system used on Owen-Magnetic passenger cars. Experimental vehicles have been driven thousands of miles in actual service, the one illustrated on this page having been used by the Atlantic Refining Co., of Philadelphia, and another has been doing express work in New York City. A great



The Bourne magnetic truck in its experimental form

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reduction in wear and tear on the chassis and substantial economy in operating costs are claimed to have been proved for the transmission by these tests.

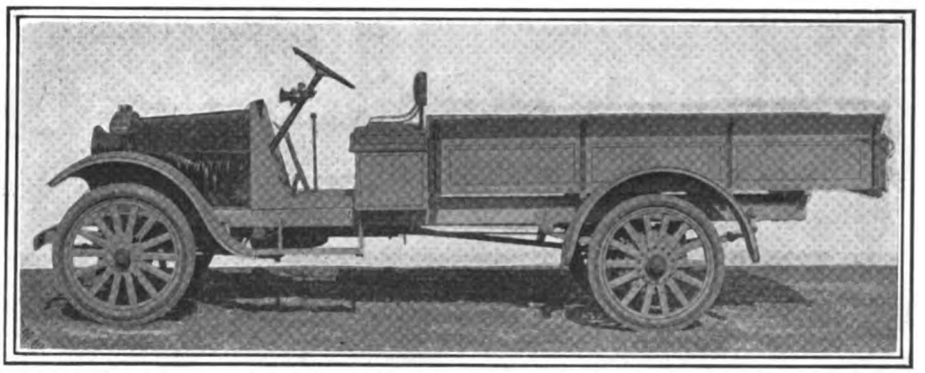
The chassis built is not an entirely new creation erected around the electric transmission unit. S. N. Bourne has built a number of special trucks with gear transmission of which a majority are in the service of the Atlantic Refining Co. They have a number of points of interest quite apart from the transmission, the most noticeable being a special method for mounting the springs. These have no shackles in the ordinary sense of the word. Instead the end of the spring is flat and makes a square contact with a rocking block, this having a rounded head which rests in a groove provided for it in a bracket attached to the frame.

The 2-ton chassis costs $3,150 and the 3½-ton $3,850. The engines used are similar, both having 5½-in. stroke and a five-bearing crankshaft. The bore of the smaller engine is 4 in. and that of the larger 4¼ in. The cylinders have individual removable heads giving maximum facility for cleaning out the combustion chambers. A non-adjustable type of carbureter is fitted and ignition is provided by high-tension magneto with fixed spark. An electric lighting and unusually powerful starting system is, of course, provided by the driving system.

The generator and motor are mounted integrally with the engine, being bolted up to the crankcase precisely as on the Owen-Magnetic car. The control operates exactly like a throttle lever, the engine control being confined to a foot accelerator. Both trucks are governed, the smaller to 15 and the larger to 12 m.p.h.

The frames are constructed to give a maximum flexibility, the side rails being 6-in. chrome vanadium channels and the cross members little more than distance pieces to keep the side rails apart. This means that a very large amount of weave is permissible and cannot result in loosened rivets.

The rear axles are of the worm type and carry two sets of inclosed brakes. In addition to these, which are operated by the usual pedal and hand lever, there is a powerful electric brake which can be brought into action any time when the truck is moving. This brake consists of an arrangement of switches which causes the part of the transmission driven by the rear axle to operate against a strong electrical resistance and the electric brake is applied by the movement of the same lever which controls the different electrical speeds.



NEW COMMERCE 1-TON TRUCK

The new Commerce 1-ton truck, made by the Commerce Motor Car Co., Detroit, which sells at $1,175, with driver's seat, governor, electric lights and starter. The governor is of Pierce manufacture and is driven off the driveshaft, limiting the speed of the motor to 1383 r.p.m. and that of the truck to 20 m.p.h. Internal-gear drive is employed, with a Torbensen rear axle. Solid tires, 34 by 3 in front and 34 by 4 in the rear, are supplied as standard equipment, but pneumatics may be had at extra cost, 34 by 4½ being used in front and 35 by 5 in the rear. The starting and lighting equipment consists of a Remy distributor and a storage battery, no magneto being used. When the purchaser specifies that he does not wish the starting and lighting system furnished as standard equipment, an Eisemann magneto is fitted

Opportunity Beckons the American Motor Truck

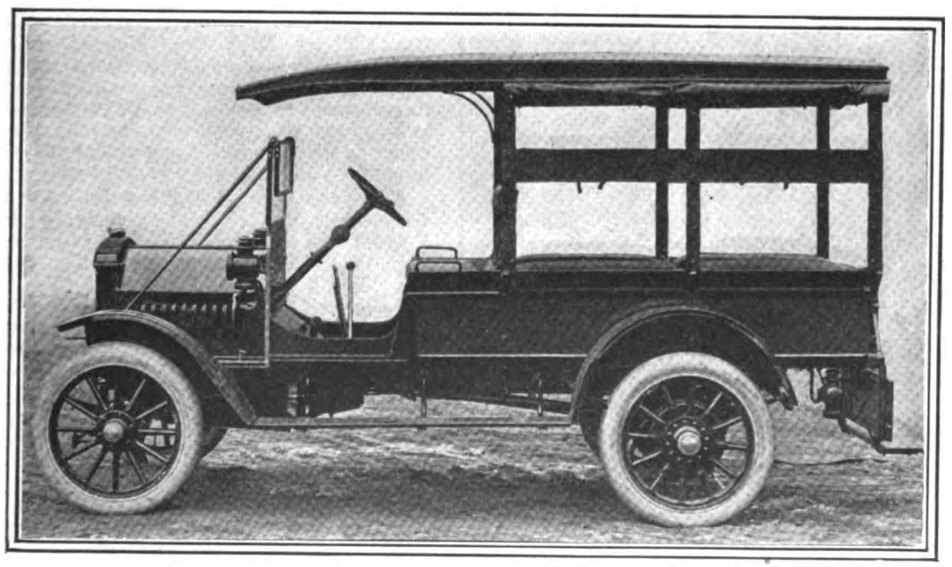
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far as the necessity of using them is concerned, there is no question. The industry is a permanent one, and one where motor apparatus could operate to the best advantage. In the daytime, work is carried on beneath the burning sun that is more favorable to motor equipment than to animal power. The utter lack of rains makes conditions more favorable for truck use. True, roads have to be built through the nitrate fields, but these have to be built for animal transportation today. It is much cheaper to build roads for motor trucks in this nitrate zone than to build railroads. Owing to the entire surface of the ground changing according as the nitrate fields develop, the advantages all rest with motor transportation as compared with railroads. The high price of fuel is naturally an obstacle, but this is not so great as in countries like Brazil and Argentina, where food is abundant for animals. Here on the nitrate fields every ounce of fodder for the animals must be transported by boat and thence by train throughout the barren area. It is equally cheap to transport motor fuel.

Already a few American motor trucks are in use in these nitrate fields. The Jeffery Quads were demonstrated in this zone nearly 2 years ago by George Gaidzik, South American representative for the concern. Some sales were made and the trucks have since been operating satisfactorily. It would seem that this field would be a fruitful one for motor vehicle trailers. The fact that the available supply of nitrate to-day is sufficient for 100 years should be sufficient to impress our manufacturers with the possibilities of the market. The zone is a large one and the service well suited for motor truck use. Our manufacturers will have to demonstrate their trucks and will have to have an adequate supply of spare parts, etc., readily available.

There are several cities, which while not located in the nitrate zone, might be said to lie within the nitrate region. The leading three are: Iquique, with a population of 40,000; Antofagasta, with 35,000, and Taltal, with 12,000. All three are joined with the nitrate fields of the interior by railroads. Antofagasta is the terminus of an international railroad that serves not only the northern part of Chile, but the southern zone of Bolivia as well.

The port of Antofagasta is not ideal for shipment of motor vehicles and motor parts, as the large steamers do not land at a dock the same as in New York, or the east coast ports of South America, but anchor perhaps 2 or 3 miles off shore, where they unload the merchandise onto lighters, which carry it to the dock. Because of this, trucks and accessories must be well crated. The cost of landing merchandise varies with the nature of the goods. The various launch owners have a tariff. There are nearly ten classes in it and the rates vary widely. In addition to charges for these launches, there are wharf charges. These two charges will vary between $2 and $40 U. S. A. gold per metric ton. At this port are two docks specially used for the shipment of nitrate.



COMMERCE ¾-TON TRUCK

The Commerce ¾-ton bevel-driven truck which sells at $875 in the chassis or $975 complete with body. It is equipped with pneumatics, 34 by 4 tires being used all around. For $100 additional electric starting and lighting are added

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Men and Makers

RANIER MOTOR CORP., New York City, has purchased a factory site of 5½ acres in Flushing, Long Island, N. Y. On it it will erect two one-story buildings to cost about $53,000. One will be 50 by 100 ft. and the other 200 by 200. Ground was broken last week for the erection of the first of the two structures. The Rainier company manufactures the Rainier 1000-pounder, as described in THE COMMERCIAL VEHICLE of Aug. 15, 1916.

Kissel Motor Car Co., Hartford, Wis., is rushing to completion a new 40 by 100 ft. addition to provide a greater assembling space. The contractor on the work is pushing the construction at top speed to earn a cash premium offered by the Kissel company for quick completion and occupancy.

Pullman Motor Car Co., York, Pa., maker of the Pullman 1000-pound delivery vehicle, has leased the plant of the Sphinx Motor Car Co., in the same city, and will use it for the manufacture of bodies and sheet metal parts.

Studebaker Corp., Detroit, has occupied its new building in Fort Worth, Tex. The new branch building, which will make Fort Worth an important distributing center in the Texas territory, will be managed by L. B. Alford, Texas district manager, with headquarters in Dallas. The new building is 150 by 265 ft., two stories in height and cost approximately $60,000.

Republic Motor Co., Boston, Mass., New England distributor for the Republic line made by the Republic Motor Truck Co., Alma, Mich., has been discontinued. The Republic company may continue the sales of its trucks through a factory branch.

Chamberlain Automobile Co., New Bedford and Fall River, Mass., which handles Velie trucks in southeastern Massachusetts, has just taken over the large garage on President Avenue, Fall River, from S. Leyland. W. T. Sandeman of Boston, Mass., has been placed in charge of the agency at Fall River.

Aaron De Roy Motor Car Co., Pittsburgh, Pa., dealer for Studebaker vehicles, has recently opened a branch in Butler, Pa., with Louis Phillips in charge, and H. W. Black as assistant manager, with supervision of the service department.

Curtis, Curtis & Lyon, distributors of the Henderson and Signal trucks in Brockton, Mass., and vicinity, have just taken over the big Allen garage at 600 North Main Street as a service station, and placed Harold E. Curtis in charge.

Waukesha Motor Co., Waukesha, Wis., will soon award contracts for the erection of its new administration building, which will include space for the engineering and drafting departments. The building will be of brick and steel, 44 by 88 ft., two stories and basement in height, to cost $25,000.

Aluminum Castings Co., Cleveland, Ohio, has purchased 18½ acres at East Forty-ninth Street and the Newburg & South Shore Railroad. The price paid for the plot is reported as $75,000. On it the company will build several new structures, the first of which will be a 900-ft. building, to cost $125,000, and to be used for the manufacture of Lynite pistons. The other structures will be erected as the increase in business demands.

Doehler Die Casting Co., Brooklyn, N. Y., has moved its brass-back bearing department from its Brooklyn to its Toledo, Ohio, plant. The latter factory consists of a brand new foundry and machine shop, which will be devoted exclusively to the manufacture of the Doehler babbitt-lined brass-back bearings.

Western Malleables Co., Beaver Dam, Wis., maker of motor vehicle castings, is enlarging its plant by the erection of a brick and steel building, 26 by 90 ft., to be used as a core room and sand shed. It is also erecting a new air-compressing plant building.

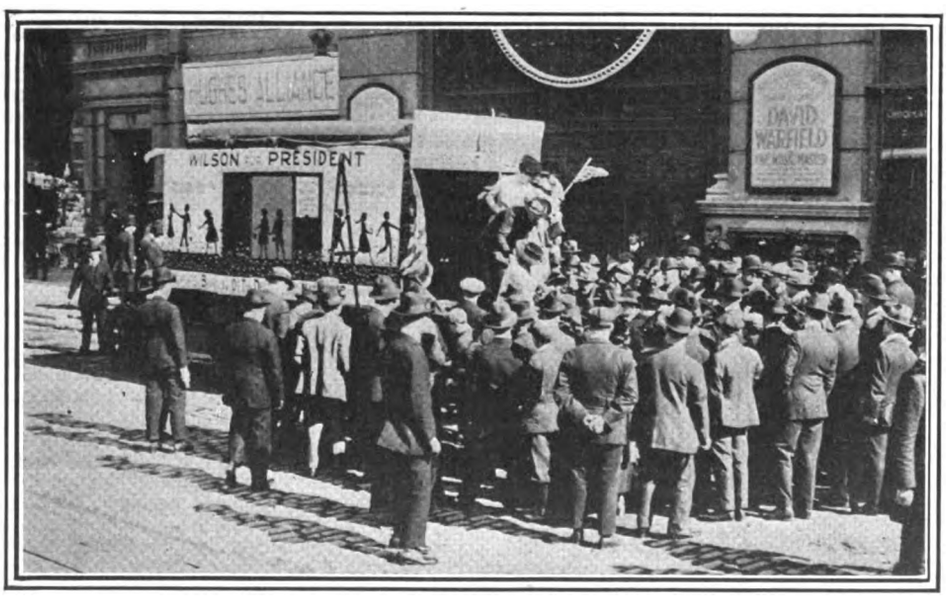
American Brass Co., Kenosha, Wis., will soon commence the erection of a new office building, 48 by 100 ft., three stories and basement in height, in addition to a private garage and service shop, 30 by 120 ft., one story high. Both of the structures will be of fireproof construction and will be equipped with sprinkler systems.

Swiss Magneto Co., Chicago, will soon be able to increase its production several fold. This has been made possible by its purchase of the plant and business of the Elkhart Mfg. Co., Monroe, Mich. The latter concern's factory is of ample size and fully equipped to make the production increase possible. There is also sufficient unoccupied area on the plant grounds to permit of expansion as the business warrants it.

Goodyear Tire & Rubber Co., Akron, Ohio, will put the 8-hr. working day into effect in all departments of the concern beginning Nov. 1, 1916. The company has been working toward this end for the past 2 years. The transition has been gradual, some of the departments having been working on the 8-hr. schedule for some time past.

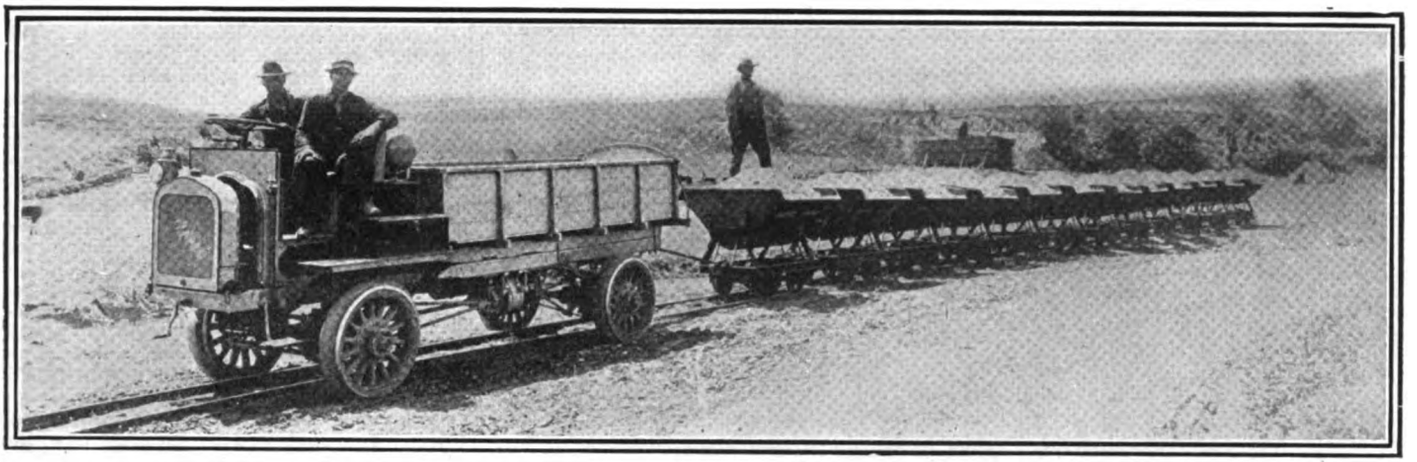
H. W. Johns-Manville Co., New York City, has opened a new branch office in Great Falls, Mont., from which it will distribute its line of motor vehicle accessories. The new office is in charge of J. H. Roe. With its opening, the Johns-Manville company now has fifty-five branches throughout the country.

Auto Supply & Equipment Co., Long Island City, N. Y., has had plans prepared for a new factory structure, 50 by 110 ft., to cost about $50,000.



The general utility of the motor truck is well illustrated in the above view, which shows a truck formerly used as a moving van in the role of a traveling stump platform in New York City. The vehicle was run under the auspices of a woman's committee of the Democratic National Committee, and women speakers exhorted their hearers to vote for Wilson on election day. Besides acting as an elevated platform for the speakers, the truck's mobility enabled a large territory to be covered in a day. An interesting feature shown in the above illustration is the manner in which the truck enabled the women to steal a march on the Hughes organization. At the left, directly above the top of the truck, the sign, Hughes Alliance, indicates a store temporarily used by the campaign committee of the Republicans. For several days the truck and its women speakers drew up almost in front of the Hughes headquarters during the noon lunch period and drew most of the listeners of the Hughes speakers away from them. Then, after most of the pedestrians had returned to work, the truck would quickly and easily move off to more fertile fields. The large area of the van body was made use of by poster coverings giving many of the reasons claimed for the desirability of Wilson's re-election.

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The great utility of the motor truck is shown strikingly in the above illustration, which depicts a F.W.D. four-wheel-driven 3-tonner hauling 26 tons of crushed rock in 1½-yard dump cars running on a narrow gage track. The vehicle is in the service of Hanlon & Oakes, contractors, of Sioux City, Iowa, and is used in place of a locomotive. The truck straddles the rails while the dump-cars run upon them as usual. The crushed rock, gravel and cement hauled by the outfit is being used in the construction of a 16-foot concrete highway running north from Sioux City on the Perry Creek road. The track is 4 miles in length, with gradients as high as 5 per cent, which the truck is able to negotiate without difficulty under full load, notwithstanding the fact that it carries none of the load itself. Ten round trips are made daily, the total load per trip varying between 24 and 26 tons and the total daily tonnage between 240 and 260, sufficient to lay between 500 and 600 lin. ft. of roadway. The truck and trailer outfit is doing the work of more than fifty teams of horses, and at a greatly-lessened cost, according to the contractors

W. H. Alford, formerly comptroller of the General Motors Co., has become vice-president and comptroller of the Nash Motors Co., maker of Jeffery trucks.

W. E. Kenyon has resigned as general sales manager of the Sandow Motor Truck Co., Chicago. His resignation will take effect Nov. 15. His future connections are not known at this writing.

C. H. Woodruff has recently been appointed manager of sales for the O. Armleder Co., Cincinnati, Ohio, maker of Armleder trucks. He was formerly identified with the United Motor Truck Co., Grand Rapids, Mich., maker of United trucks, as assistant general manager.

George M. Graham, formerly editor of the motor vehicle department of one of the large Philadelphia, Pa., newspapers, and a free lance writer on passenger car and motor truck subjects, has joined the advertising organization of the Willys-Overland Co., Toledo, Ohio. He will give his particular attention to the research and publicity work of the advertising department.

Fred Henderson of Henderson Bros., makers of the Henderson truck at Cambridge, Mass., has left the firm to go into business on his own account, and he has taken a lease of a new building being erected on Commonwealth Avenue, Boston, Mass., in which he will handle the Signal truck. The Henderson will be marketed by the old company at Cambridge.

T. J. Turk, chief engineer of the Inter-State Motor Co., Muncie, Ind., has been appointed assistant general manager of the company. He will also retain charge of the engineering department, as previously. The Inter-State company manufactures the Inter-State 850-pound delivery car, as described in THE COMMERCIAL VEHICLE of Oct. 15, 1916.

J. Murray Page has been transferred from his position as manager of the Los Angeles, Cal., branch of the Locomobile Co. of America, Bridgeport, Conn., to the concern's branch in Chicago. Practically all of Page's business career has been spent with the Locomobile company, as he entered its service in 1899, and the following year was appointed manager of the service department of the New York City branch. Three years later he returned to the factory, where he was identified with the production department. After 3 years he then became manager of the San Francisco and Los Angeles branches. As manager of the Chicago branch he succeeds A. J. Banta, whose resignation became effective on Nov. 1.

J. R. Corby has recently been appointed manager of the factory branch of the Chicago Pneumatic Tool Co., Chicago, in St. Louis, Mo., and will handle the sales of the Little Giant trucks made by the Chicago company in the St. Louis territory.

James A. Russell, for 7 years connected with the Los Angeles, Cal., branch of the Studebaker Corp., Detroit, has recently been appointed retail sales manager of the Atlanta, Ga., branch.

Henry Fink has recently been placed in charge of the Milwaukee, Wis., branch of the Sterling Motor Truck Co., maker of the Sterling trucks, in the same city.

H. W. Spaulding, formerly in charge of the Packard-Missouri Motor Co., St. Louis, Mo., has been promoted to become vice-president, in charge of sales for the same company.

Gilbert S. Loomis, formerly in charge of the Packard Motor Car Co.'s interests in Louisville, Ky., has been appointed general manager of the Packard-Missouri Motor Co., St. Louis, Mo.

Guy Hutchinson, formerly sales manager of the Corbin Motor Vehicle Co., and later sales manager and treasurer of the firm of Hart & Hutchinson, became manager of the Willys-Overland branch in New York City on Oct. 1.

Alvan T. Fuller, who handles the Packard line in eastern New England, has just opened new salesrooms at New Bedford, Mass., where he will be in a position to place trucks in the big mills, as that part of the New England territory now finds it must depend a great deal on commercial vehicles, instead of trains. Fred C. Graves, who has been with Mr. Fuller for 16 years, has been transferred there as manager, with J. H. Kennedy as assistant, and C. J. Cawley and J. J. McDougal as salesmen. John J. McGinty of the Providence agency is installing the service equipment.

E. J. McIntyre, who has the agency for southern New Hampshire for the Jeffery trucks, with headquarters at Manchester, has just approved plans for a service station on Elm and Prospect Streets.

W. H. Marble has taken the agency for the Velie truck in southeastern Massachusetts. His headquarters are at Brockton, Mass.

Earl B. Chase has taken the agency for the Velie line for Rhode Island and will demonstrate the trucks from salesrooms at Franklin Street, Providence, R. I.

Charles B. Abbe, formerly with the Chase truck sales force at Springfield, Mass., has taken a position with the Stoddard Motor Co., agent for the Riker truck, in the same city.

Lionial D. Rheinhart and Samuel N. Daub, Stamford, Conn., have recently formed the Rheinhart-Daub Automobile Co. to handle Studebaker vehicles exclusively in that city.

Fred Crowe, for some years with The White Motor Co. at New Haven, Conn., but who resigned to enter another line of business some months ago, has returned to the company and is in charge of the truck sales department.

Officers of the New Departure Mfg. Co., Bristol, Conn., were elected at a stockholders' meeting held on Oct. 17. They are as follows: De Witt Page, president and general manager; Frank P. Furlong, vice-president; Charles T. Treadway, treasurer, and Arthur C. Hitchcock, secretary. The board of directors is made up of the above officers and T. G. Treadway and E. R. Burwell.

Henry Splitdorf, inventor of the magneto which bears his name, died at his home in New York City on Oct. 16 at the age of 82. He was born in Germany. His eldest son, C. F. Splitdorf, is the present head of the Splitdorf Electrical Co., Newark, N. J.

Walter T. Sewell, sales manager of the Sewell Cushion Wheel Co., Detroit, is making a trip through the eastern section of the country and will visit the company's branches in Pittsburgh, Pa.; Baltimore, Md.; Philadelphia, Pa.; Boston, Mass., and New York City.

B. R. Miller has resigned as manager of the San Francisco, Cal., branch of the Bosch Magneto Co., New York City. He is succeeded by Lee C. Carlton, who has

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The store department of the Union Pacific Railroad recently installed motor truck service in connection with the operation of its Omaha, Neb., store. The new equipment, which supersedes the former teaming transfer system, is a 2-ton United chassis purchased from the McKeen Motor Car Co., of Omaha. The truck will handle the company's materials and supplies locally in Omaha and the immediate vicinity. It is not understood that the railroad will use motor trucks for the inter-city deliveries of its railroad stock, as this tonnage amounts to hundreds of cars per month and is distributed to the various railway points by store department steam locomotives and special trains

been identified with the engineering department of the company in New York City.

Edward W. Leahy, a member of the Kingsbury-Leahy Co., Albany, N. Y., designer and manufacturer of passenger car and motor truck bodies, has disposed of his interests in the concern and will henceforth devote his time to other lines of endeavor.

John L. Wierengo, formerly general sales and advertising manager for the Continental Motors Co., Detroit, has resigned to become general manager of the Detroit Truck Co., Detroit, maker of the Tonford Ford adapter.

Arthur L. Edwards has become manager of the Detroit branch of the Kelly-Springfield Tire Co., New York City. He succeeds to the position through the death of his father, George D. Edwards, who had been with the Kelly-Springfield company for 21 years, and had built up the Detroit business of the concern. The present incumbent as manager has been with the company for 14 years.

Clyde S. Thompson has been appointed advertising director of the Miller Rubber Co., Akron, Ohio. Before becoming president of the Thompson-Carroll advertising company he was identified with the Diamond Rubber Co. up to the time it was consolidated with the B. F. Goodrich Co.

Thomas J. Glenn, for many years manager of the New England branch of the Firestone Tire & Rubber Co., at Boston, Mass., has been granted a long leave of absence due to illness, and the branch is now in charge of J. T. Clinton, formerly of the New York branch.

Maurice Brennan, formerly connected with the Palmer & Singer Mfg. Co., and for the past 3 years secretary of the Duplex Engine-Governor Co., Brooklyn, N. Y., has resigned to become general office executive of Herz & Co., civil engineers in New York City. He will have charge of the advertising and sales work for that concern.

Mave Maloney, El Paso, Tex., is one of the few women who have made a success in the motor vehicle accessory business. Mrs. Maloney is said to be one of the best accessory salesmen, or rather, the best saleswoman, in the western or southwestern territory. She handles the Master carbureter and is especially well posted on the mechanics of carburation, or, in fact, any other technical feature of a motor vehicle. She has personally conducted several Master carbureter tests on some of the United States Army motor trucks and motorcycles stationed at or working from the El Paso base.

F. R. Humpage has resigned as manager of the Dyneto Electric Co., Syracuse, N. Y., to become secretary-treasurer of the Wilt Twist Drill Co., Walkerville, Ont., Can. Mr. Humpage is well known in the motor vehicle trade, having been identified with the industry since 1903 in executive capacities with the Packard, Thomas and other companies.

Edward E. Eagle has been elected president of the Sherman-Eagle Co., Inc., New York City, manufacturer of the Sherman shock absorber.

E. Guenther has recently been placed in charge of the accessory department of the Puritan Machine Co., Detroit.

Milwaukee's First Motor Truck Theft occurred recently when a thief entered a garage in that city and rode off with a 3-ton truck. While many passenger cars of both the gasoline and electric type have been stolen in the past in that city, it is said that the present instance is the first on record where the thief has turned his attention to purely business vehicles. Many hours later the truck was found abandoned and slightly damaged on a road 10 miles from the garage.

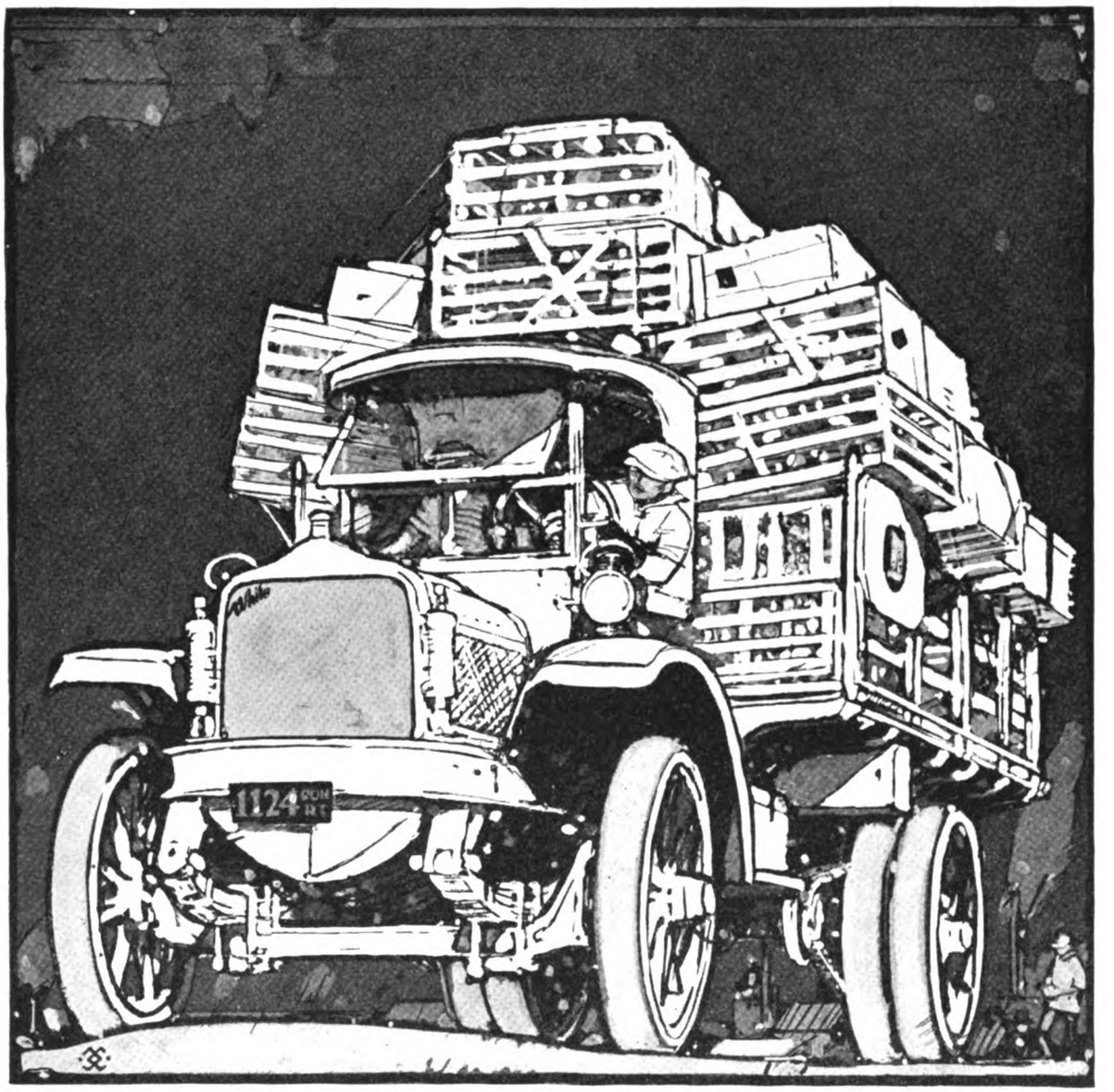
The Goodyear Process Exhibit was one of the most interesting and instructive features of the Goodyear Tire & Rubber Co.'s district and branch managers' conference, held recently at the company's Akron, Ohio, plant. It consisted of ten separate exhibits. Seven of these were given over to the display of pneumatic motor vehicle tires, solid tires, inner tubes, tire-savers, motorcycle and bicycle tires, aeronautic supplies and mechanical goods. In each of the individual exhibits, the particular product shown was traced through the successive steps in the process of manufacture. Perhaps the most educational of all the showings was the raw materials display in which were shown specimens of every kind of crude rubber, samples of numerous kinds of cotton fabric entering into the manufacture of Goodyear tires. The display included a section of a rubber tree, showing how the rubber is taken from it in liquid form through incisions in the bark. It also showed how the fabric is manufactured, tracing each of the steps in succession. The service department display showed how proper inflation and careful driving will increase tire mileage and how lack of care and improper inflation cause the premature destruction of a tire. In the chemical booth were shown the various ingredients which are mixed with rubber to make it more serviceable, just as other minerals are mixed with gold to make it more durable. The entire exhibit created such a large amount of interest that the Goodyear company decided to throw it open to the public after the completion of the conference. Many school teachers and their pupils took the opportunity to view it as an interesting and practical lesson in geography and manufacturing methods.

A Motor Truck Is Wanted in Venezuela, according to a foreign trade opportunity published in the Oct. 21, 1916, issue of *Commerce Reports*, which states that an exporter in that country is desirous of obtaining a truck or tractor of 3 tons capacity. Further information regarding the inquiry may be obtained from the main office of the Bureau of Foreign & Domestic Commerce, Washington, D. C., or from any of its branches in the larger cities throughout the country.

British Imports of Gasoline in 1915 amounted to 146,000,000 gallons, of which more than half was exported from the United States and Mexico, and nearly all of the remainder from the Far East. The 1915 imports were 26,000,000 gallons in excess of those in 1914 and 40,000,000 gallons more than in 1913. The imports from Jan. 1 to July 3, 1916, amounted to 72,268,680 gallons. This amount for the half-year period is about half the imports for the year previous, so that at the present rates the 1916 imports will approximately equal those of 1915. Of the gasoline so far imported this year, the most was received from the Dutch East Indies and the next largest amount from the United States.

Electric Trucks Are Wanted in Cuba, according to a letter received by a firm in this country from a commission merchant there who is desirous of forming commercial relations with American manufacturers and exporters of electric trucks of from 1 to 3 tons capacity. The merchant wishes to act as a representative and will furnish references. Further information regarding the inquiry may be obtained from the Bureau of Foreign and Domestic Commerce, Washington, D. C., or from any of its branches in the larger cities in this country. Refer to Foreign Trade Opportunity No. 22378.

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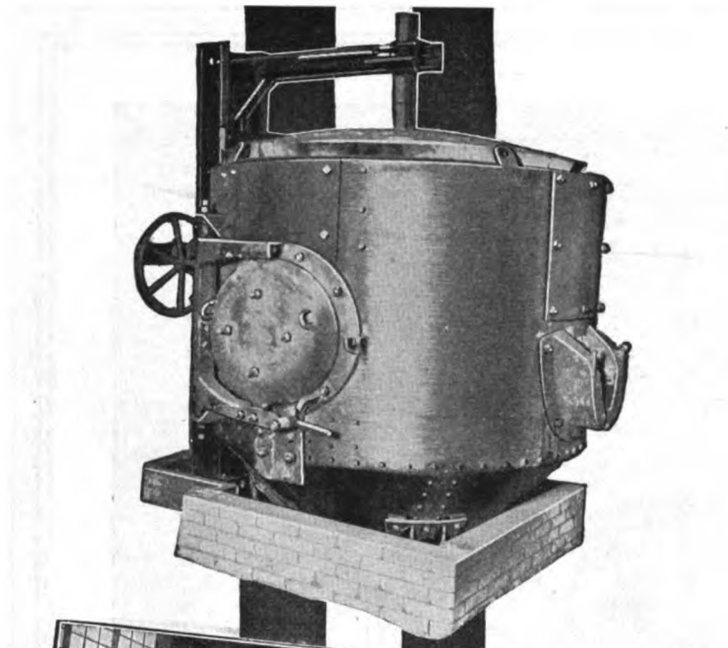
WHITE TRUCKS

A SUPERIOR product is not the whole advantage in dealing with The White Company. Its wide and varied experience, covering the special transportation problems of thousands of motor truck users, is an asset second in importance only to the product itself.

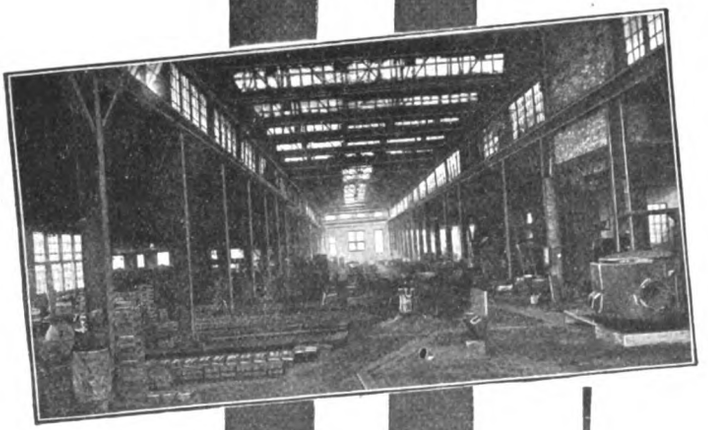
There are more White Trucks put into service each year than trucks of any other make, and furthermore, this predominance is nation-wide, among all classes of users.

THE WHITE COMPANY
CLEVELAND

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"SIVYER"

Electric Steel Castings

for truck manufacturers who aemand "Quality First"

Regardless of how well your truck is designed, the service it gives can not be satisfactory if the castings aren't right. That's why "Sivyer Electrically Refined Steel Castings" is *written into the specifications* of trucks of proven worth.

For steel properly refined in the Electric Furnace can be made purer, consequently better than is possible by any other method. Its strength, toughness, resistance to crystallization, its impregnability to repeated shocks, strains, stress—these qualities explain why it gives a service no other steel can approach.

Quality SIVYER S STEEL Castings

But there is more to electric steel castings made the Sivyer way than mere conversion of the metal. From raw material to finished casting, every process must measure up to an unchangeable high standard of quality. Wherever possible, castings must be machine molded to insure a uniform product, true to pattern. Every casting must be thoroughly sand-blasted, ground, tumbled, cleaned, so *your* machining and finishing costs will be an absolute minimum. Moreover, our rigid inspection and elimination of castings liable to prove defective insures highest efficiency and *complete satisfaction in service.*

Your trucks can be a *complete* success only with successful castings. Write us today. Send your specifications. We will prove to you the advantage of "Sivyer" Electric Steel Castings in service.

Sivyer Steel Casting Co.

MILWAUKEE WISCONSIN



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STUDEBAKER

Commercial Cars

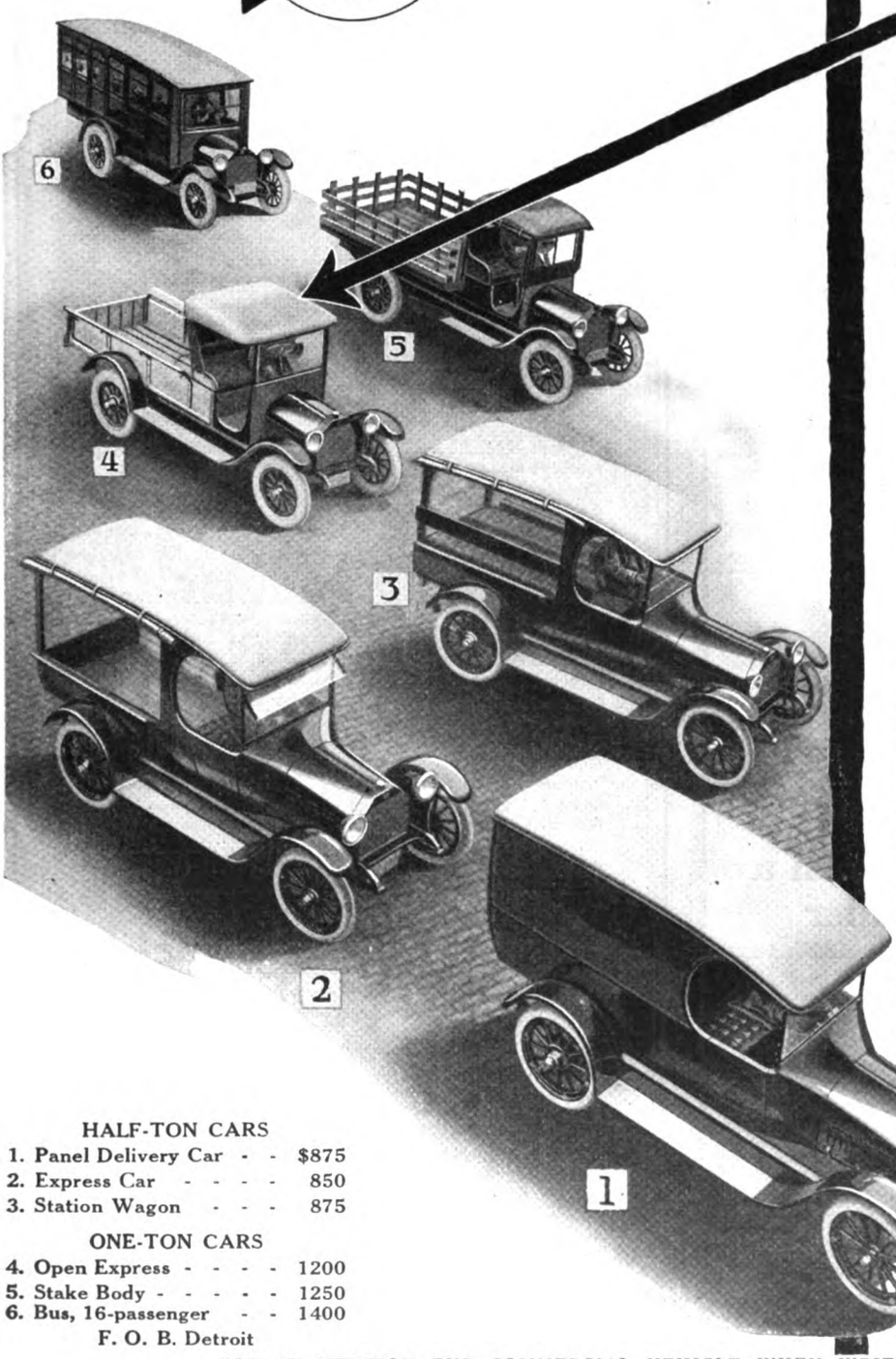


Another of the Studebaker OPPORTUNITY Commercial Cars—the one-ton Express at $1200—This Truck is only ONE of the Studebaker line which comprises SIX of the fastest-selling commercial cars on the market. But think of the selling possibilities of this ONE car:

Agricultural Implement Dealers
Bakers
Newsdealers and Stationers
Butchers and Markets
Contractors
Department Stores
Dry Goods Stores
Feed Dealers
Furniture Dealers
Hardware Stores
Manufacturers
Wholesalers
and many others.

This, of course, is only a partial list of the opportunities that lie in the Studebaker Dealer's hands with one car. When you remember that there are FIVE other cars each of which has fully as extensive sales opportunity, you can begin to realize the chance that a progressive man has who gets into the commercial car business EARLY.

And when you consider the success that Studebaker Dealers are already enjoying in this rapidly growing industry, owing to the GREAT values that the Studebaker models represent, you can appreciate why so many merchants are dropping other lines of business to become Studebaker Dealers. Write for the FACTS.



HALF-TON CARS

1. Panel Delivery Car	$875
2. Express Car	850
3. Station Wagon	875

ONE-TON CARS

4. Open Express	1200
5. Stake Body	1250
6. Bus, 16-passenger	1400

F. O. B. Detroit

STUDEBAKER
Detroit, Mich.
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Address all correspondence to Detroit

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WEST'S CAST-STEEL WHEELS for MOTOR TRUCKS



"Patent Pending"

Are used by America's leading Truck Builders

These wheels were designed by, and are built under the supervision of, experienced engineers. They have been thoroughly tested and have proved they will stand hard usage and abuse.

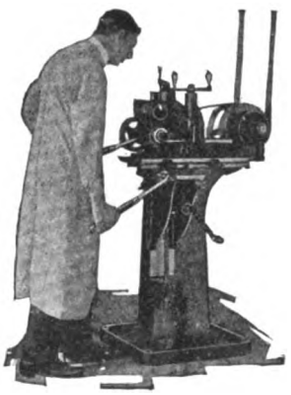
Over 25,000 WEST'S CAST-STEEL WHEELS are now used on trucks and not one of them has failed to give satisfaction. Specify WEST'S CAST-STEEL WHEELS on every heavy truck you buy.

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The West Steel Casting Company

805-815 E. 70th St. Cleveland, Ohio

"Watch the West Cast-Steel Wheels Go Round"



Equip Your Garage with a Whitney Hand Miller

so you won't have to turn away profitable repair business, or turn it over to the machine shops.

With this all-round machine you can handle the work in your own garage. You can avoid delays; you can accommodate customers.

The Whitney will take care of any milling job in the line of auto repairs. With it you can cut gears, cams, sprockets, do key seating, straddle milling, profiling, slotting, slabbing, drilling, die sinking and countless other operations.

Simply send a postal for Catalog No. 7

The Whitney Mfg. Co. Hartford, Conn.

Chains—Keys—Hand Milling Machines.

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Wisconsin Motor Mfg. Co 77
Wood Hydraulic Hoist & Body Co 74
Wyman & Gordon Co., The 67



1½-3-5 and 7 Ton Sizes

DOUBLE end steering device of original design makes it not only possible but EASY to back trailer anywhere. Double swiveled tongue; no other trailer has it.

Also pole, semi, and pleasure car trailers.

Detroit Trailers are used by *Cadillac, Ford, Saxon, Reo, Jeffery* and other large auto concerns who know good trailers when they see them.

MONEY FOR DEALERS

The demand for trailers is increasing rapidly as you know. An agency for a good trailer is a good thing, and an Agency for the Detroit Trailer is the best proposition in the Trailer line.

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Branch for Canadian Trade—Walkerville, Ont.

GUARANTEED FORGINGS

Made according to specifications of Specially Selected Material Scientifically Heat Treated and Delivered at the Time Agreed

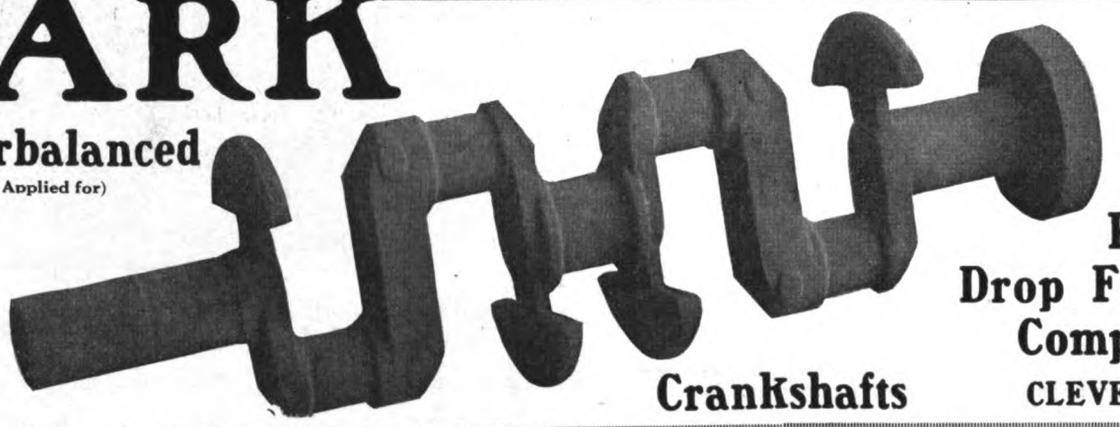
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WYMAN-GORDON

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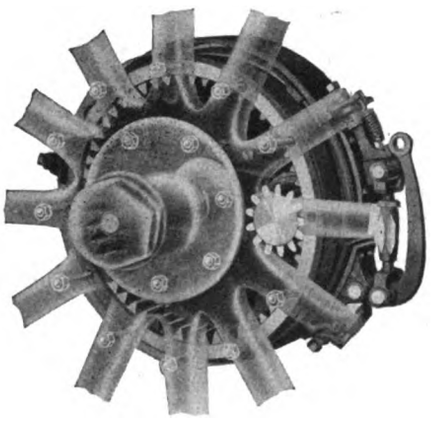
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Counterbalanced
(Patent Applied for)



Crankshafts

The Park Drop Forge Company
CLEVELAND

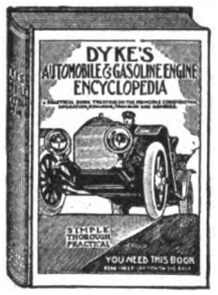


Celfor

THE INTERNAL GEAR DRIVE AXLE

The coming drive for all trucks that have to work to earn their cost—least attention—trouble-proof—drive near rim of wheel. Half-ton to five-ton capacity.

Celfor Tool Company
Buchanan, Michigan, U. S. A.



HERE'S YOUR REPAIRMAN, Reference, Guide and Instructor (Simplified) 1750 illustrations, 696 pages, 49 instructions

Here's the Book You Need

—tells you how to diagnose and remedy any trouble.
—teaches you the PRINCIPLE of all engines, valves, carburetors, ignition, self-starters—in fact, everything you want to know.
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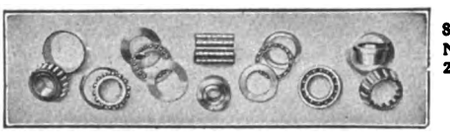
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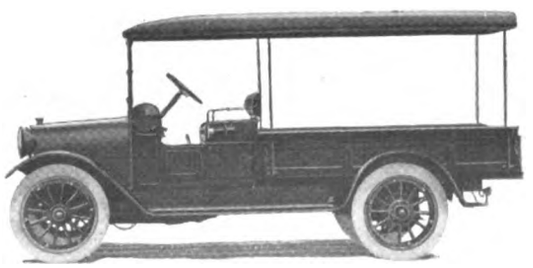


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Their durability, flexibility, serviceability—their simplicity of operation and low upkeep will establish low-cost-per-mile records for you.

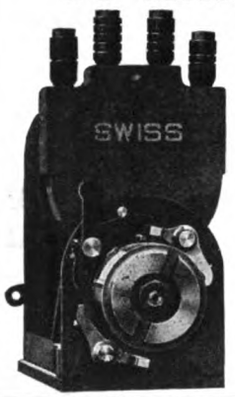
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KISSEL MOTOR CAR CO.
HARTFORD, WIS.

Rapid Delivery ¼ ton.....$ 950
Worm Drive "Tonner".....1250
Worm Drive "2 Tonner"...1875
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TO MANUFACTURERS:



DON'T RUIN YOUR REPUTATION FOR THE SAKE OF A FEW DOLLARS

You think you save by installing cheap ignition.

You are bound to be found out by the owner—you know it—and sooner or later *you* will be the heavy loser.

The Swiss Magneto Costs You a Little More—but Gives the Best Ignition

It gives the Hottest Spark, the Most Accurate Timing and the *Only* Perfectly Reliable Ignition under *all* conditions. Time and again it has stood *100% perfect* under the most severe, prolonged and varied tests by impartial boards of engineers.

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Specify— "Must Be Harvey"

Truck Springs must be mighty good springs to withstand the severe usage to which they are subjected. The Harvey patented process of forming and tempering insures a quality that defies breakage or sagging.

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The Thomas is keyed to do things a little better than the best—it has a mission beyond the ordinary. What you know about other trucks is no guide as to what your customers can expect from the Thomas.

The Two Ton Worm Drive

YEARS AHEAD

Dealers—write for specifications and open territory

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Pumps and Tanks
Save you money

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1-Ton to 5-Ton Capacity

Service Worm Drive TRUCKS

Complete Line for Every Commercial Need

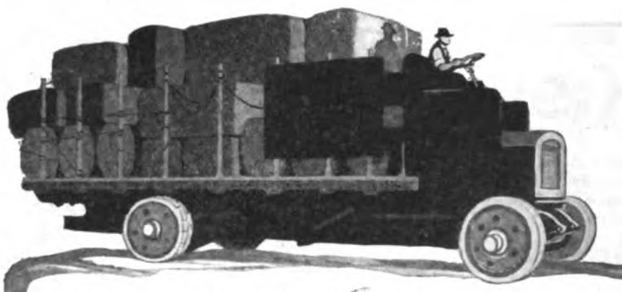
Service Motor Trucks are built especially for hard, steady service—to stand up under all reasonable loads, and travel all roads.

Many years' practical experience in building motor trucks exclusively enables us to produce a truck that will stand the test of time in actual use under all conditions.

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Service Motor Truck Co.
101 Grand Street Wabash, Ind.



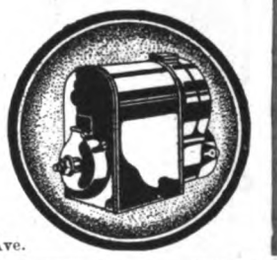
In the Steady Grind of Heavy Work—

you need power—steady, reliable, unfailing power. The

EISEMANN MAGNETO

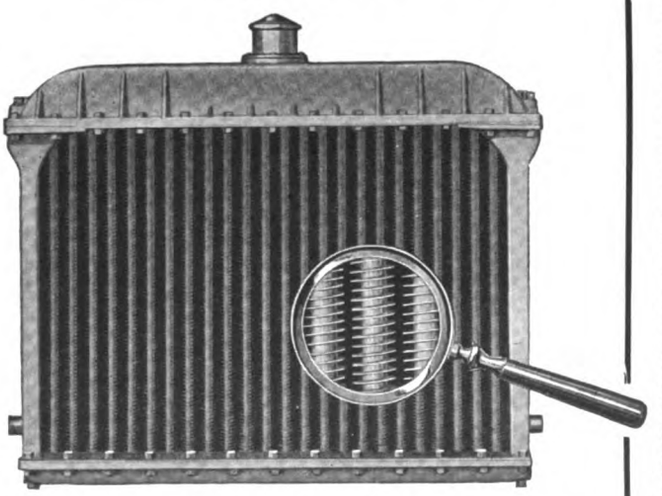
is known throughout the land for a Hot, Sure Spark at all speeds (even the lowest); Easy Starting; Simple, Sturdy Construction.

Proof: 108 Manufacturers of Trucks, Tractors, Pleasure cars, etc., use nothing but Eisemann. Pretty good evidence!



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Seamless Copper Helical Tube Cooling Sections



Are Guaranteed for the Life of the Motor on Which They are Installed

Helical Tube Construction is Accepted as the Best by the Leading Truck Makers of America

Manufactured only by

ROME-TURNEY RADIATOR CO.
ROME, NEW YORK

NORTH AMERICAN MOTORS

4-⅜ in. x 6 in.—45 H. P.—1200 R. P. M.

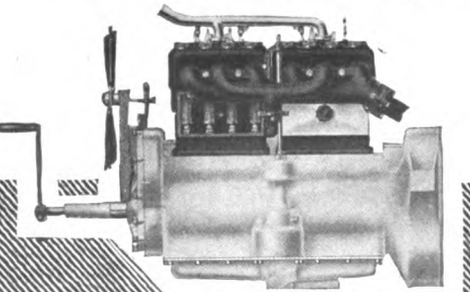
Expressly Designed to Take Care of the Most Exacting Conditions in Truck Service

Model N is a Long-Stroke Motor with a Tenacious Pulling Power—the very essential demanded by successful builders of motor trucks.

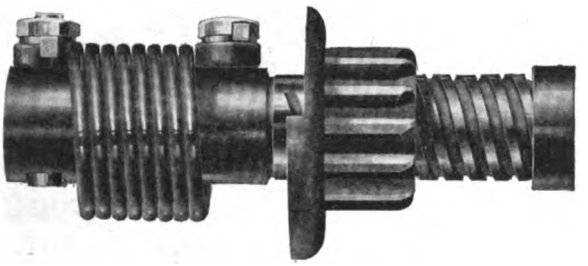
Rich with such features as Timing Shaft driven by Silent Chain, Speed Governor, Valves all on one side, enclosed and easily accessible by removable plates, and intake and exhaust manifolds on one side, with magneto on opposite side, removed from heat of exhaust manifold.

There are other good reasons why you should use the North American Motor. Let us tell you about them and quote prices.

North American Motor Co., Pottstown, Pa.
Detroit, 1325 Dime Savings Bldg.



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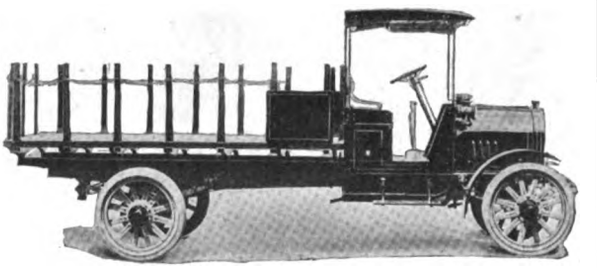
Strength and Efficiency in Motor Starting

Commercial vehicle manufacturers in greater numbers every day are recognizing the economy and absolute dependability of the

ECLIPSE-BENDIX DRIVE

It is the positive connecting link between the starting motor and the shaft, and it is doing uninterrupted service on 125 makes of cars. Starter-equipped cars are the better if they have it.

ECLIPSE MACHINE CO.
ELMIRA, N. Y., U. S. A.



Sullivan Two Ton Truck

Sullivan Trucks have been designed and constructed after years of experience and practical tests in hands of users.

The highest grade units are used: Buda Motor, Bosch Magneto, Brown-Lipe Clutch and Transmission, Timken Bearings, Timken Worm Drive Axle.

Made in 1½ Ton and 2 Ton Capacities.

Dealers who are interested in a line which will bring satisfied users, should obtain further details.

Sullivan Motor Truck Corporation
1701 East Avenue ROCHESTER, N. Y.

DON'T

throw your old bearings away just because they are worn or broken.

We regrind the raceways (without drawing the temper) insert new balls and retainer AT about one-fifth the cost of a new bearing.

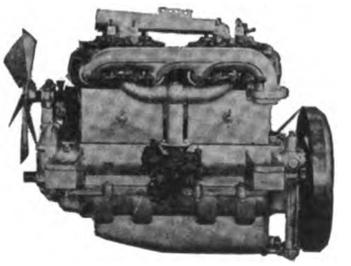
Any broken or worn bearing can be exchanged at any of our service stations, for reground bearings of any type or make, which are guaranteed equal to new.

These stations also carry complete stocks of New Single Row Annular, Thrust, NEW DOUBLE Row and Radax Bearings.

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Beaver Motors Make Their Way By The Way They Are Made

BEAVER MOTORS are made by truck motor specialists. The concentrated experience of engineers of international reputation is embodied in their construction.

BEAVER TRUCK MOTORS are made by men who make nothing but motors—who, by doing the same thing over and over have become masters in perfection. That is why we can make truck motors better, quicker, and at less cost than the truck manufacturer himself.

We make truck motors of all sizes, for all requirements. No matter whether you are building a 1,500 pound light delivery wagon or a 5-ton truck, we can meet your demands for power, economy and dependability.

Do not determine on a motor for your truck till you have sent us your specifications.

BEAVER MFG. COMPANY
Milwaukee Wisconsin

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M&S DIFFERENTIAL

THE success of the M & S on the Jeffery Quad and the overwhelming evidence of severest tests long since established "the differential that pulls both wheels" as the ideal one for commercial motor vehicles.

Write for interview or send in your specifications.

M & S CORPORATION
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DETROIT

Garford
MOTOR TRUCKS

Garford Trucks range from one ton to six tons in capacity.

They are designed and built by men who have spent their lives in the study of motor trucks.

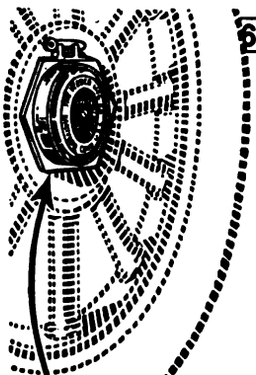
They are backed by one of the strongest organizations in the industry.

Bodies are provided to meet all requirements.

Write for catalog. Please address Dept. 103

The Garford Motor Truck Co., Lima, O.





Gasoline

Do not judge which brand of gasoline will give you the most miles per gallon by *claims*. Judge the brands by performance and check it up with a

Veeder Hub Odometer

Your upkeep records will then be based on the accurate number of miles travelled. For Veeder Hub Odometers like the other Veeder Products, are noted for their absolute accuracy. Equip your trucks or pleasure car with them now.

Price complete $20. Special model for Ford Cars, $15.

Cyclometers for Bicycles and Motorcycles. Odometers for Automobiles and Horse Drawn Vehicles. Counters for practically every purpose. Tachometers, Tachodometers and Fine Die Castings.

Veeder Mfg. Co.
54 Sargeant Street Hartford, Conn.

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Stop That Leak!

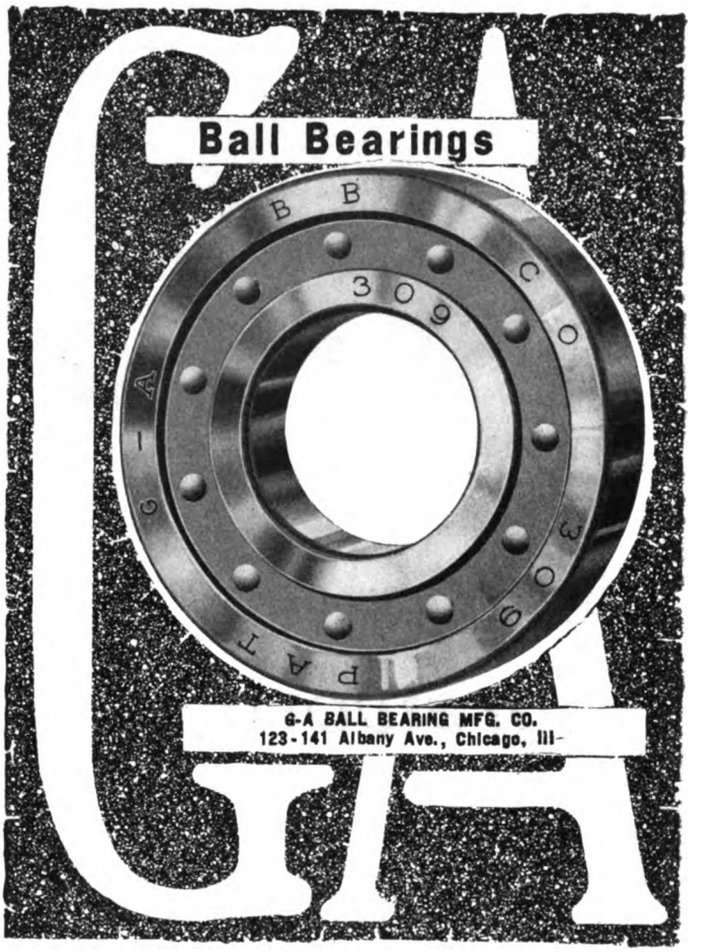


The Editor of "Commercial Vehicle" writes:
"A waster of time who drives a truck makes the cost of truck delivery or haulage higher than it should be.
"The employer of a waster of time is equally as guilty as the shirker himself. The former's responsibility lies in the fact that he allows such a condition to exist. *He should make it impossible for his drivers to soldier on the job without detection."*

The Servis Recorder

prevents "soldiering" because the driver knows it's there—watching him. It is good for the good man and bad for the waster, because it shows up the qualities of each. Tells just what your truck does and when.
"We found a driver was loafing on an average of 3 hours every day," says one user.
No one can possibly tamper with it because it *records every such attempt.* Attached or detached in a minute. Has no flexible shafts or outside connections.
Write for facts about its application to your business—and a list of users.

The Service Recorder Company
Branches in Twelve Cities
CLEVELAND - - - - OHIO



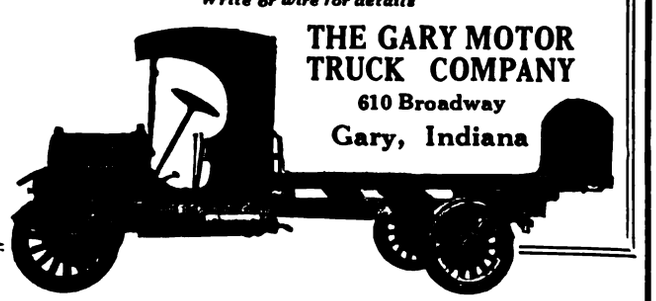
The Star Union Brewing Co., of Peru, Ill., is duplicating—

The Worm Drive GARY TRUCK

—now on duty in Peru, for its Peoria branch.

It's the same story we've had to tell ever since GARY Trucks first became established in the field—50% of our business is repeat orders from GARY owners—the best recommendation for Gary service.
Every refinement known to increase efficiency is incorporated in the GARY Truck, by expert workmen.
The result is 4 GARY models, 4 capacities at 4 prices that are right—ready to handle any load you want to move—and to give satisfaction that will make you come back for more.
Try one GARY in service with any assortment of best known trucks. Your fleet will eventually be a GARY fleet.
Dealers—Reorders and generous new business make GARY the logical truck for dealers.

Write or wire for details

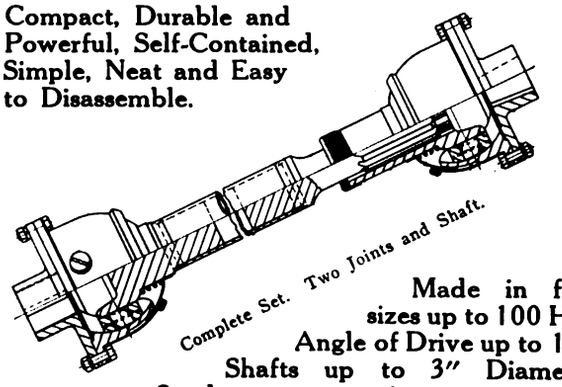


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Compact, Durable and Powerful, Self-Contained, Simple, Neat and Easy to Disassemble.



Complete Set. Two Joints and Shaft.

Made in four sizes up to 100 H.P.
Angle of Drive up to 15°.
Shafts up to 3" Diameter.
Send us your requirements.

Also "Hele-Shaw" Clutches and "M. & E." Grease Cups

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"TYPE D"
Heavy Duty Hoist with Standard Coal Dump Body

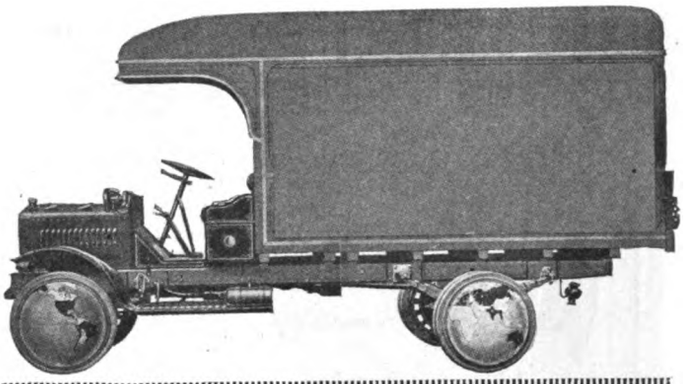
By Way of Foreword

preceding an important announcement by the Wood Hydraulic Hoist & Body Company, to be made on or about January 1st, 1917, we strongly urge all parties expecting to place orders for dump body equipment within the next six months to get in touch with us by letter for advance information.

Your prompt action on this suggestion will bring you the particulars by return mail.

Wood Hydraulic Hoist and Body Co.
DETROIT

WOOD HOISTS
WOOD BODIES

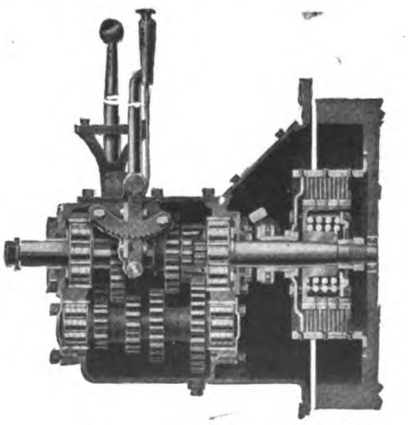


WICHITA TRUCKS
Dependability Plus Extensive Service
ARE YOU THE DEALER

who can put into your salesmanship WICHITA Energy and Spirit and back up your selling accomplishments with WICHITA Service?
If you are such a dealer, we have an interesting selling plan that you will not want to miss considering.
The faithful co-operation of our factory organization will give you encouraging help.
We want live dealers NOW—Men who will interest concerns in our heavy-duty trucks, and then to not let up on them until they sell them.
Request us to immediately submit our plans.

WICHITA FALLS MOTOR COMPANY
Arthur Boulevard, Wichita Falls, Texas

COVERT COVERT COVERT
TRANSMISSIONS



Made in various models for different sizes and types of cars—Covert Transmissions will free you from transmission troubles. Let us show you how they fit your construction.

Covert Gear Company, Inc.
Sales Office, Detroit, Mich. **Factory, Lockport, N. Y.**

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Ensure your mileage

Have positive assurance that your trucks are being run economically. Equip them with the

DREADNAUGHT
Indestructible
Hub Odometer

It gives you sure, accurate mileage records—enables you to eliminate waste in your truck operation. Always working—not even a collision will stop it. A new one free, if you break it or knock it off.

Send now for our booklet and prices

AMERICAN TAXIMETER COMPANY
Manufacturers of Jones and Popp Taximeters
1765 Broadway New York City

Standard
MADE IN DETROIT USA

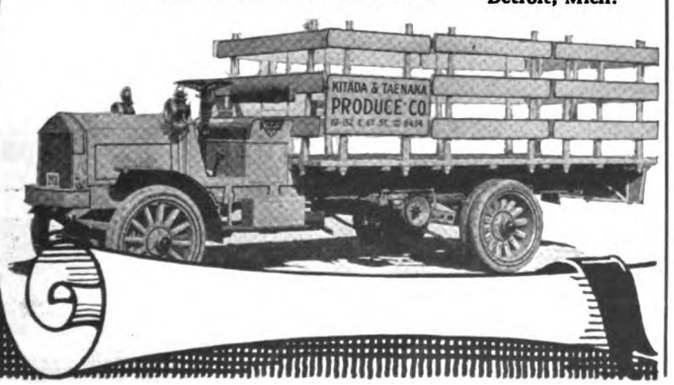
Motor Trucks

Startled the Motor Truck Industry By a Unique Sales Plan

First of all, the Standard is an unusual truck. It is a powerful combination of many of the world's best-known units—the Continental Motor; Timken Axles; Timken Bearings; Brown-Lipe Gears, and other well-known standard parts.

The Standard Motor Truck is sold in an unusual way. Any responsible person can be the agent for the Standard, with absolutely *no investment—no deposit* and *no contract.*

Write for details of this plan. No obligation.
STANDARD MOTOR TRUCK CO., 315-327 Bellevue Ave. Detroit, Mich.



"NORMA"

"NORMA" BALL BEARINGS

(PATENTED)

Remember this:—Truck performance is a combination of a number of separate unit performances in the truck equipment. For instance, the engine performance is determined largely by the magneto performance. Whether you get satisfaction, or dissatisfaction, from your lighting and starting system depends upon the performance of your generator and starting motor. And not one of these accessories is better than the poorest part in it.

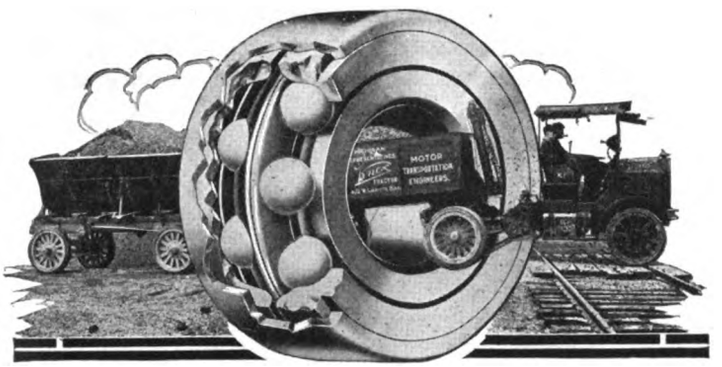
The makers of practically all the trucks and cars of the better class have safeguarded their customers against trouble due to bearing failures in the electrical accessories by adopting magnetos, lighting generators and starting motors in which "NORMA" Bearings are standard.

Are Your Electrical Accessories "NORMA"-Equipped?

THE NORMA COMPANY OF AMERICA
1790 BROADWAY NEW YORK
Ball, Roller, Thrust, Combination Bearings

"NORMA"

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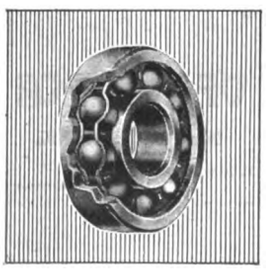


In the Knox heavy duty Tractor, the transmission shafts and the differential assembly are supported and the thrust of the bevel driving pinion is taken by

NEW DEPARTURE BALL BEARINGS

American Made for American Trade

In the selection of New Departures for these important points, where frictional resistance must be reduced to a minimum and where strength and dependability are all important, the builders of this tractor were influenced by their knowledge of New Departure quality, adaptability and service—the three factors that have appealed to so many other manufacturers and responsible for the use of New Departure Ball Bearings in such a large majority of American-made motor cars of every type and size.



Single Row

Every manufacturer, dealer in, or prospective buyer of Motor Trucks, should read the book—"New Departure Ball Bearings in Commercial Applications." Send for a copy.

THE NEW DEPARTURE MFG. CO.

BRISTOL, CONN., U. S. A.

Conrad Patent Licensee

Western Branch: 818-20 Ford Bldg., Detroit.
Distributors in Trade Centers Throughout the United States.
British Agents: Brown Bros., Ltd., London, E. C.
For Continental Europe: Jacob Holst, Copenhagen.

MONARCH

LIMITS THE SPEED AND THE EXPENSE



THE IDEAL GOVERNOR

Trucks are called upon to withstand unwarranted abuses—the commonest and the most destructive of which is *speed*.

The Monarch governor automatically and positively limits the speed without affecting the power.

It's the only governor designed solely for internal combustion engines. There are no revolving parts—no gears or shafts. Requires no attention—not even oiling. The predetermined maximum speed is fixed (and padlocked) by the truck manufacturer. Unauthorized hands cannot change it.

Get descriptive booklet of the governor that limits the speed and expense.

Monarch Governor Company
Detroit, Michigan U.S.A.

United States 'Solid Truck' Tires

Truck Tire Efficiency

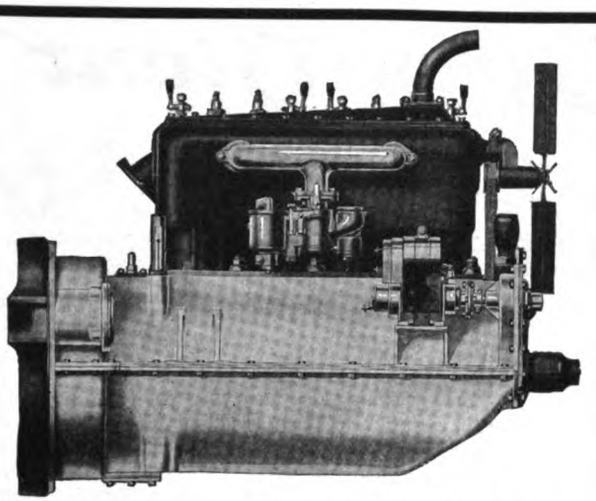
Our new, secret process compound, vulcanized under a pressure of 1,600,000 pounds (almost four times the pressure used to vulcanize ordinary truck tires) has more vitality, rugged strength and durability than any other compound manufactured.

For this reason, United States Solid Truck Tires are the strongest and most durable now on the market.

United States Tire Company
1790 Broadway, New York City

US RUBBER SYSTEM — UNITED STATES RUBBER COMPANY AND ASSOCIATED COMPANIES

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A Real Long Stroke Truck Motor

Type T U, 4 x 6; Type U U, 4½ x 6; cylinders interchangeable. Crankshaft, four bearing, chrome nickel steel, 2 in. diameter. Bearings, bronze, Fahrig metal lined. Camshaft, one piece, cams integral. Oiling system, force feed, hollow crankshaft.

WRITE FOR COMPLETE SPECIFICATIONS.

WISCONSIN MOTOR MFG. COMPANY

Station A, Dept. 319 **MILWAUKEE, WIS.**

New York Branch: 50 Church Street. T. M. Fenner, Factory Representative. Pacific Coast Representative: Earl P. Cooper Co., 1428 Bush Street, San Francisco; 333 West Pico Street, Los Angeles.

Wisconsin CONSISTENT **Motors**



R & M CONFORM PISTON RINGS

Installed on One Truck, Rapidly Spread to Entire Fleets

The best test of successful performance is the adoption of R & M Conform Piston Rings on entire fleets of trucks after trial on one car.

R & M Conform Rings are 3-part construction—the bull ring V-shape, and 2 conform rings of corresponding angles, permitting one to ride on the other.

The result is a leakless ring, preserving all the power from the motor, materially reducing operating expense of your fleet.

Try R & M Rings on one truck. *Write for free illustrated literature today.*

Manufacturers, Send for Details

Modern Electric & Machine Co.
INDIANAPOLIS **INDIANA**

THE MARK OF A BETTER RADIATOR

G & O Radiators for Heavy Duty Service

The G & O Mfg. Co.
New Haven **Connecticut**

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ONE TRUCK SELLS THIRTEEN

THE above illustration is one of a fleet of twenty MACK trucks in the service of the Metropolitan Coal Company of Boston and its subsidiary branches.

Their first

Mack

Worm Drive Truck

purchased in January of this year, made such a wonderful record in the worst snow storms and under the worst road conditions that Boston has ever experienced, that the company decided to standardize on MACK trucks.

Thirteen more MACK one and one-half ton dump trucks have been ordered already.

Incidentally it is a pretty good stroke of business for our Boston representative.

Write for particulars.

THE INTERNATIONAL MOTOR COMPANY
West End Ave. and 64th St.
New York City

"Little Giant"



The Power-Bred Truck

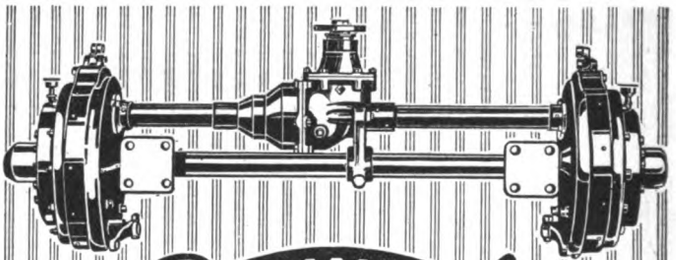
MECHANICAL power is bred into the Little Giant Trucks of today—just as strength and endurance were bred into the Percherons of the past. The Little Giant is lively, responsive, like a fine-spirited horse—yet, like a young Mogul Locomotive, it is dependable twenty-four hours in twenty-four. Thousands of Little Giant owners proudly boast—"it never had a tow-rope on it yet."

THE "LITTLE GIANT" LINE INCLUDES

Model 15—1-ton Worm Drive
Model H—1-ton Chain Drive
Model H—1½-ton Chain Drive
Model 16—2-ton Worm Drive
Special Bodies for Every Purpose

Agents wanted for desirable territory

CHICAGO PNEUMATIC TOOL COMPANY
1085 Fisher Bldg. CHICAGO — **52 Vanderbilt Ave. NEW YORK**
Branches and Service Stations Everywhere



Russel

Internal Gear Drive Axles

SELLING trucks these days is not difficult, for the industries of the country are awakening to the advantages of motorized delivery.
Make your sales even easier by using trucks driven by the Russel Internal Gear Drive Axle.
Industrial preparedness demands that the most serviceable, durable and efficient form of truck haulage be adopted by you.

Adopt, therefore, a truck using The Russel Internal Gear Drive Axle

Russel Motor Axle Co., North Detroit

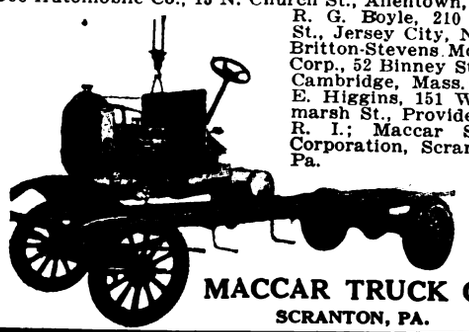
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MACCAR

Delays Cost Money

The MACCAR never stays off the road more than 30 minutes, because of power-plant trouble.
If anything happens you substitute a new power-plant—no expensive tying up of your truck for time-consuming repairs.
The motor, clutch, transmission, radiator, pump, magneto, carburetor, dash and toe boards, brake and foot pedals, steering gear and all spark and throttle controls, are assembled dust-proof, in one cradle and as a Unit mounted into the frame.
Dealers will find in the MACCAR AGENCY a new and profitable proposition. Write now for details.

Distributors:
Pitts Motor Car R & S Corp., 540 Atlantic Ave., Brooklyn, N. Y.; Maccar Sales Co., 2116 Market St., Philadelphia, Pa.; Bee Automobile Co., 15 N. Church St., Allentown, Pa.; R. G. Boyle, 210 10th St., Jersey City, N. J., Britton-Stevens Motors Corp., 52 Binney St., E. Cambridge, Mass.; W. E. Higgins, 151 Whitmarsh St., Providence, R. I.; Maccar Sales Corporation, Scranton, Pa.



MACCAR TRUCK CO.
SCRANTON, PA.

There's An Easier, Safer Way

Instead of always having to help your brakes this way, why not put in Thermoid Brake Lining and let the brakes do their full work? That is easier and safer everywhere—on hills, at crossings and especially just before the accidents that might have happened.

Thermoid
HYDRAULIC COMPRESSED
Brake Lining-100%

Thermoid never lets go. Always it has that steady, friction gripping power that means safe stopping. It contains more material than any other brake lining. It is compressed under hydraulic pressure into a solid, unyielding substance thoroughly impregnated with a friction compound impervious to heat, water, oil, gasoline or dirt.



Cannot be burned out nor affected by oil, heat, water, gasoline, dirt.

Thermoid Rubber Company
Trenton, New Jersey
Makers of a full line of automobile accessories and mechanical rubber goods.



AUTOCARS
are equipped with the
"JASCO" TANK

Why? Because demonstrated service facts have proven that this gasoline receptacle makes fuel absolutely safe from fire or explosion and devotes every drop to energy.



"JASCO" TANKS are made of drawn steel. They are seamless, tinned and tested and positively cannot spring a leak even under the most severe conditions. They are money savers, life and property protectors. If your car is equipped with an old fashioned riveted tank you are courting danger. Investigate the "JASCO" today. Full details on request.

The "Jasco" Tank is used and indorsed by the following prominent manufacturers:

PLEASURE CARS

Biddle Motor Car Company, Simplex Automobile Company, Mercer Automobile Company, Lozier Motor Company, Stanley Motor Cariage Company, James Cunningham Son & Company, H. H. Franklin Mfg. Company.

TRUCKS

Baldwin Locomotive Works, Autocar Company, General Vehicle Company, H. G. Burford Company, Peerless Motor Car Company, Garford Motor Truck Company, Gramm Motor Truck Company, Thomas Auto Truck Company, Motor Trucks, Ltd., Canada.

JANNEY, STEINMETZ & CO.
Main Office: PHILADELPHIA
New York Office: HUDSON TERMINAL BUILDING

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Prepare Now For Winter!

Don't wait until the real cold weather sets in and the streets are covered with ice and snow, before getting "NEVER - SKIDS" for your motor trucks.

THE NEW TYPE

NEVER-SKID

practically eliminates vibration

Does away with skidding and affords positive traction on slippery streets. The crosspieces are made of the finest quality woven steel wire—strong enough for the heaviest machines made.

The device can be applied in a few minutes without jacking up the truck, and there is no danger of its catching in driving chains or damaging tires.

YOU WILL SURELY NEED "NEVER-SKIDS" this winter.

Why not get them now?

Folder and prices will be gladly sent

NEVER-SKID MFG. CO.

122 Liberty Street, New York, N. Y.

New England Distributer: WILLARD B. DAVIS, 39 Danforth Street, Fall River
Chicago Distributer: FRED ALLEN AUTO SUPPLY CO., 1610 S. Michigan Avenue

DIAMOND T

TRUCKS

Diamond T Service is as thoroughly built into our ¾-ton trucks, the smallest of the line, as it is in our 3½ ton model.

Its low cost is made possible only by its wide popularity which has enabled us to produce this model in enormous quantities. There has been no cheapening of quality or inferior workmanship permitted in its design or construction.

For a thousand uses it is the most satisfactory and economical delivery vehicle ever marketed. With a body suited to your requirements, it will improve your delivery service while lessening your operation expense.

Write to-day for catalog.

Diamond T Motor Car Co., Chicago, Ill.



Cullman Sprockets

For Diamond, Baldwin and Whitney Chains

Differentials

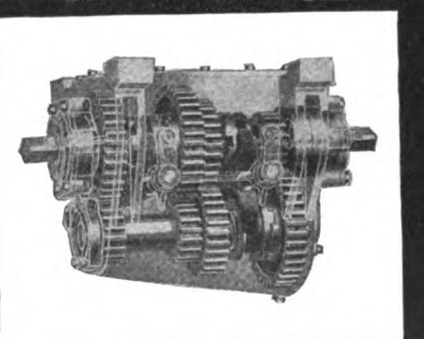
Sprockets in stock and to order

Send for Catalog

Cullman Wheel Co.

1350 Allgeld Street
CHICAGO

COTTA TRANSMISSIONS

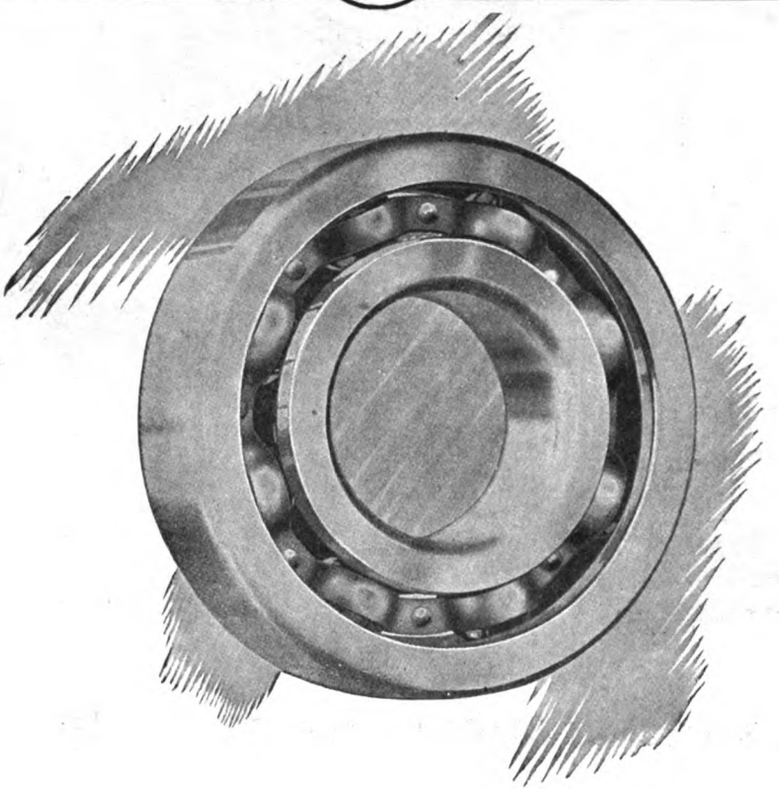


All Gears Always in Mesh

An Assurance of Dependable Service

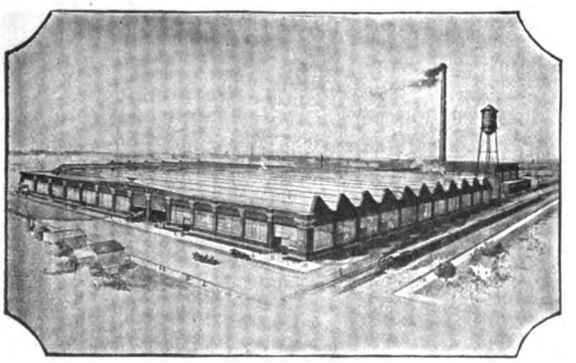
The Cotta Transmission Co.
Rockford, Ill.

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U. S.

BALL BEARINGS



What We Mean by Balanced Bearings

It isn't so much the question of the number of balls in a ball bearing—

It isn't so much the thickness of the raceways which carry those bearings—

But rather the designing of the one part in relation to the other part, so that both perform to their fullest possibilities, within certain definite factors of safety.

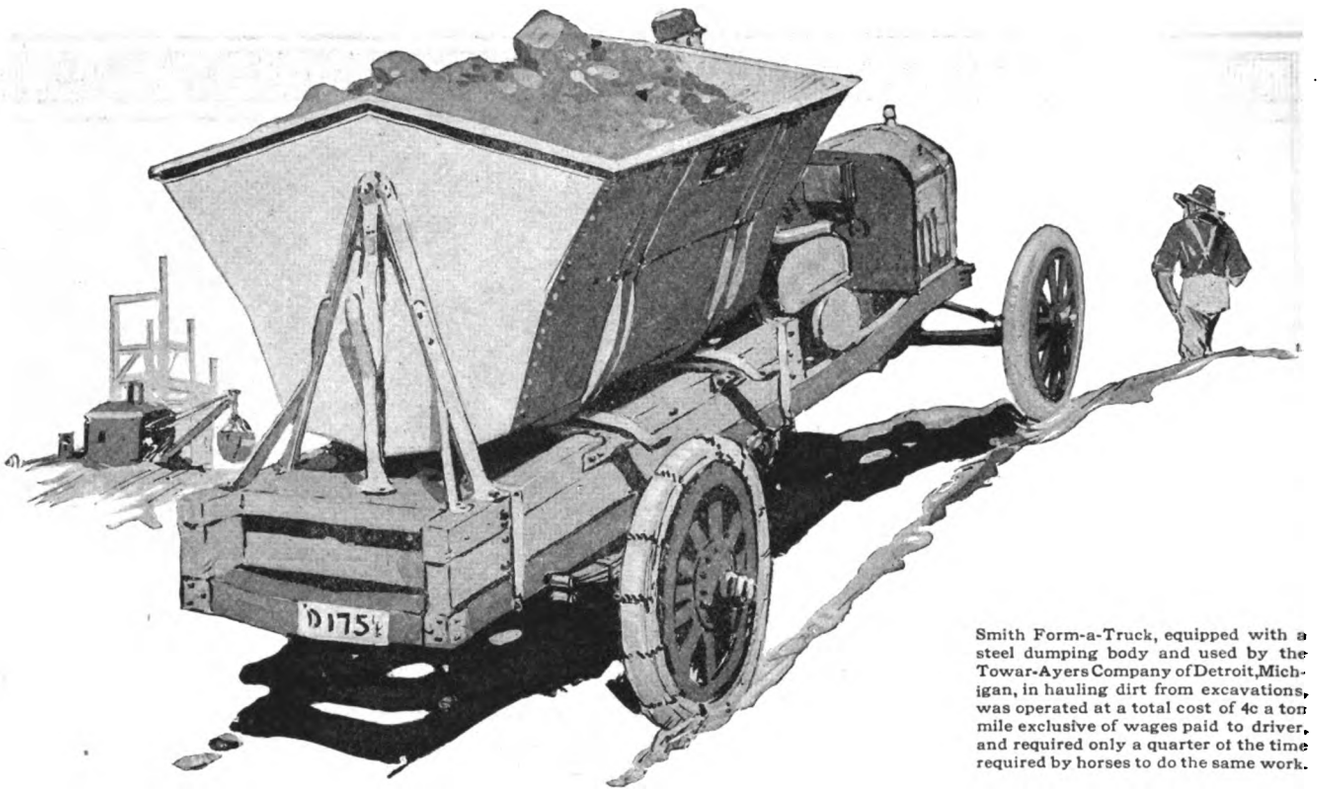
The point we are making is that we might add two or three balls to our bearings and still have a weaker bearing than we have at present.

Conditions must be balanced.

U. S. BALL BEARINGS are balanced bearings because there are just the right number of balls to supply the correct capacity to the proper sized raceways. And it is this proper blending or balancing of the various components of U. S. BALL BEARINGS, combined with the high quality of materials and extreme care in production, that gives to U. S. BALL BEARINGS their extremely high carrying capacity

U. S. Ball Bearing Manufacturing Co.
(Conrad Patent Licensee)
Palmer St. and Kolmar Ave. Chicago

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Smith Form-a-Truck, equipped with a steel dumping body and used by the Towar-Ayers Company of Detroit, Michigan, in hauling dirt from excavations, was operated at a total cost of 4c a ton mile exclusive of wages paid to driver, and required only a quarter of the time required by horses to do the same work.

The Lowest Hauling Cost in the World

Smith Form-a-Truck

$350

F. O. B. Chicago

The first Smith Form-a-Truck attachment was sold in Sumner, Washington, four years ago. This Smith Form-a-Truck has already run 18,000 miles at a total cost for repairs of $8. The average load hauled has been 2200 pounds and the Smith Form-a-Truck has been in service every working day.

Now Smith Form-a-Trucks are being bought in fleets, ranging from twenty or thirty up to two hundred by many of the largest concerns in the country.

The Smith Form-a-Truck attachment, combining as it does with any Ford or Maxwell power plant to make a fully guaranteed one-ton truck, has definitely established the value and service standard in the one-ton field.

Its acceptance by general business as the standard vehicle in service in which the loads average from 2,000 to 4,000 lbs. is shown by the fact that contracts for Smith Form-a-Trucks already total nearly 40% of the total production of trucks, all makes, for this year.

In every community the Smith Form-a-Truck dealer is a leader—the man doing the biggest and most successful business.

Smith Form-a-Truck Co.

Executive Offices and Salesrooms, Suite 911 Smith Form-a-Truck Bldg.
1470 South Michigan Avenue, Chicago, Illinois

Eastern Branch	*Pacific Coast Branch*	*Southern Branch*
1834 Broadway, New York	Pico and Hill Streets, Los Angeles	120 Marietta Street, Atlanta

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Ames Transfer Company's Pierce-Arrows paid for themselves by economies effected

This well-known New York contracting company bought in July, 1911, the second Pierce-Arrow 5-ton truck that was offered for sale. At the time of this purchase they had forty mules and a variety of wagon equipment which have since been replaced by trucks. The first ten Pierce-Arrows of the present Ames fleet of twenty-five were entirely paid for out of operating economies effected by the trucks added to the sum obtained by the sale of wagon equipment and mules.

To say that the Ames officials are satisfied with this showing is to put it mildly. They figure that they have obtained a large part of a new and efficient motor transportation system absolutely without expense.

During certain rush periods in their work they have rented trucks of various makes other than Pierce-Arrow. They were naturally interested in the comparative showings made in competitive tests of this kind, and they report that the Pierce-Arrow trucks have invariably proved by far the most efficient and economical.

Some of these Pierce-Arrow trucks of the Ames Transfer Company have already run well over 50,000 miles, and it is interesting to note that no perceptible wear has yet been observed in the worm-gear.

THE PIERCE-ARROW MOTOR CAR COMPANY
BUFFALO, N. Y.

PIERCE
PIONEER WORM DRIVE

The Worm-Gear

All Pierce-Arrow Trucks are equipped with the worm-gear drive, which is a positive guarantee of effective service under the most difficult conditions.



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FOLLOWING A GOOD EXAMPLE

When a Texas cowboy continually carries a particular make of revolver you are likely to rely upon that weapon for you know that upon its proper action in time of need his very life may depend.

The same thing holds good concerning the continued use for many years of

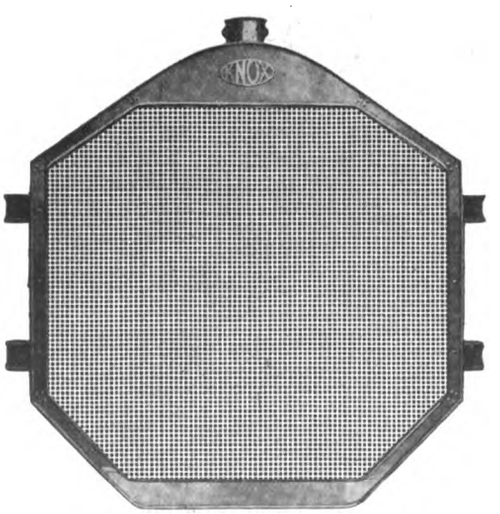
FEDDERS RADIATORS

by many of the largest manufacturers of both motor trucks and pleasure cars.

The Truck User's selection is governed by no whim or fancy. What he wants is **service, good service, unbroken service.** To him, breakdowns mean delayed deliveries, loss of time, loss of money, loss of business. It does not help him much to know that a faulty part will be "made good" after its failure has cost him credit, cash and customers.

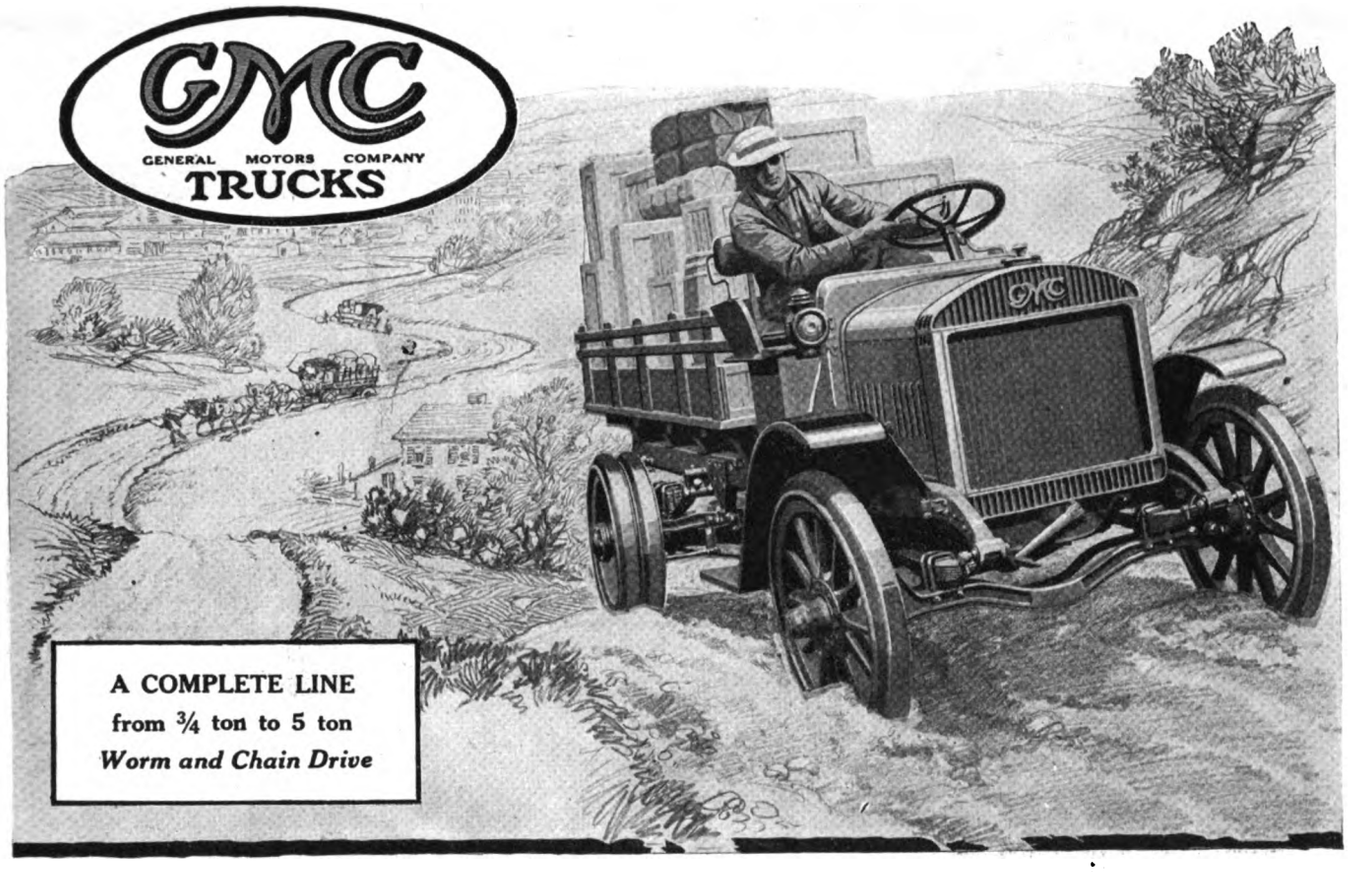
He wants parts that **will not break down in the first place.** He, therefore, joins with the Touring Motorist in demanding FEDDERS QUALITY.

FEDDERS RADIATORS are standard equipment in cars of the highest grade.



FEDDERS
MANUFACTURING CO.
BUFFALO, N. Y.

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GMC Performance Is Winning Truck Buyers Everywhere

Stop, if you will, for a minute, you men who know trucks, and consider what it is that makes GMC Trucks superior—gives them greater pulling power, lower operating cost, lower upkeep and greater dependability

It's their sturdy, rugged, substantial construction—parts that are amply strong and durable—that's it—it's the way GMC Trucks are built that makes them superior.

Built by experienced truck builders, with a thorough knowledge of truck requirements—GMC Trucks are practical, common-sense trucks.

You can buy them knowing that they are fitted for the work—knowing that they will operate at lowest cost per ton mile—require the minimum of attention—and render year in and year out satisfactory profitable service.

For the daily performance of GMC trucks in all lines of business furnishes visible, convincing evidence of their worth—concrete evidence of what GMC Trucks will do for you.

There is a GMC of the proper size and type for any business. See the nearest GMC dealer or write Truck Headquarters direct.

GENERAL MOTORS TRUCK COMPANY

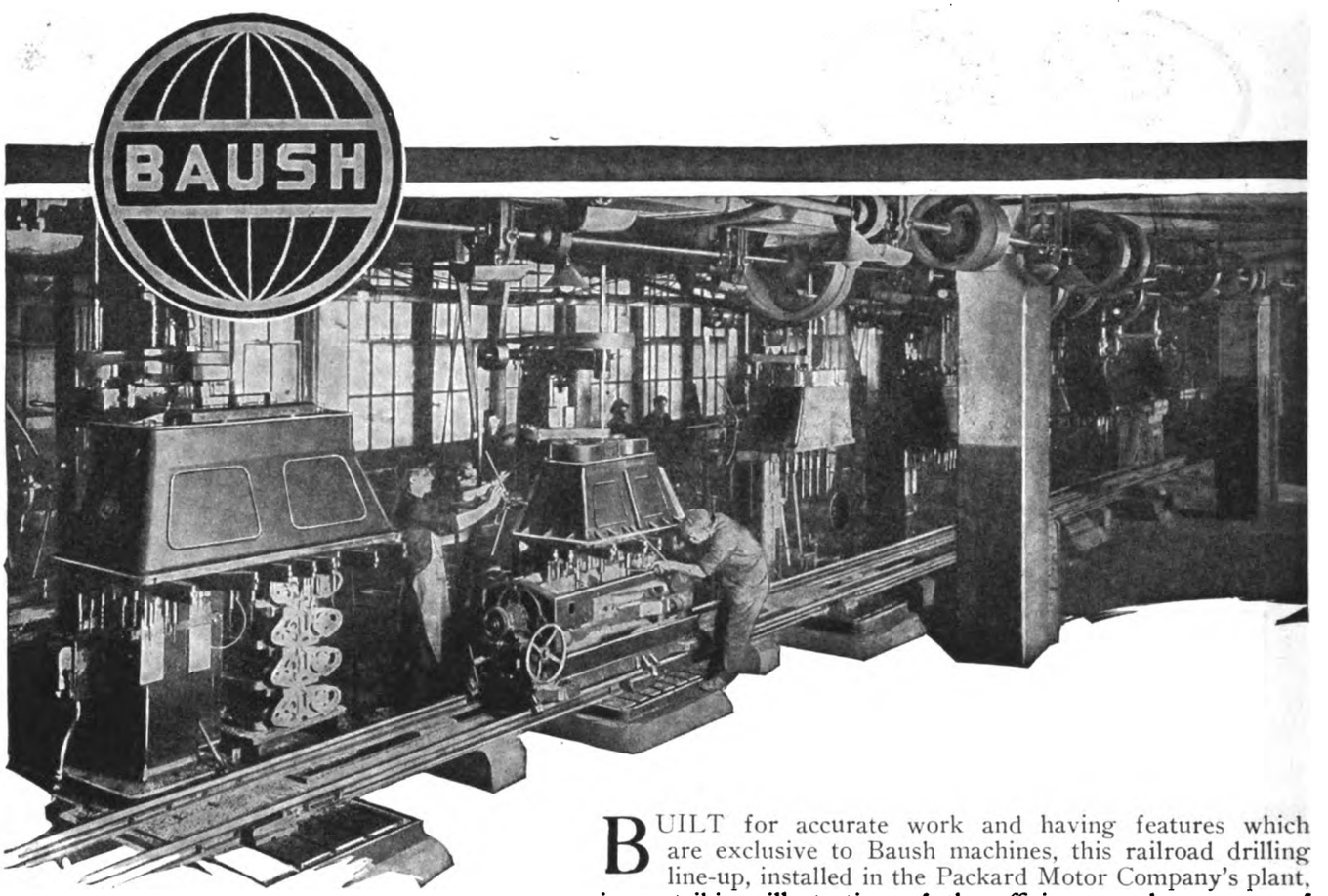
One of the Units of the General Motors Company

PONTIAC, MICHIGAN

Direct Factory Branches: *New York, Boston, Chicago, Philadelphia, St. Louis*

(116)

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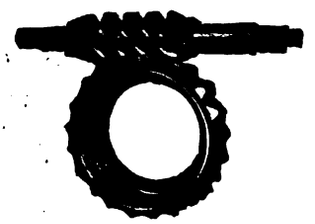


BUILT for accurate work and having features which are exclusive to Baush machines, this railroad drilling line-up, installed in the Packard Motor Company's plant, is a striking illustration of the efficiency and economy of Baush multiple drills.

The Packard requirements are best served by having a number of standard multiple drills in a straight line with a jig mounted on a car and arranged to turn so that various positions can be obtained without resetting the jig. This particular rig will bore about 200 holes, ranging from ⅛ to 5½ in. in diameter, and one or many jigs can be in use at the same moment. Various changes can be made in this layout without affecting the machine equipment, as all the machines are adjustable.

The machines are all standard tools, and their drilling capacities cover a wide range. The heads may be either of round or rectangular shape. The single machine illustrated here is one of our heavy type multiple drills equipped with 16 spindles capable of drilling in steel with 1½-in. drills at a feed equal to .01 inch per revolution. The arms have neither lugs nor projections on the inner ends, and can be adjusted to centers as close as the diameter of the spindle nose. The vertical adjustment of each spindle is controlled at the extreme outer end of the arm.

Baush drills will effect large economies in your production costs. You will find it advantageous to consult with our engineers in reference to equipment requirements.



We specialize in worm gear units for motor cars and trucks.

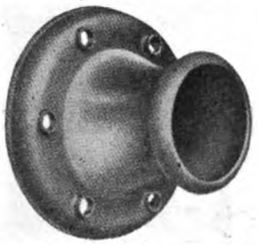
Baush Machine Tool Company

Springfield : : Mass.

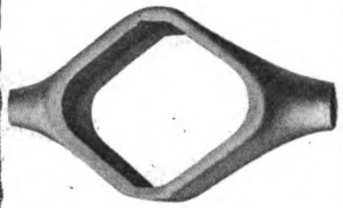
DETROIT OFFICE: DIME SAVINGS BANK BUILDING

Fenwick Freres & Co., France, Holland, Belgium, Switzerland, Italy, Spain, Portugal; Alfred Herbert, Ltd., Coventry, England, for Great Britain, Ireland, India, Burma, Ceylon, British South Africa, Japan, Manchuria, Corea, Formosa.

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BOSSERT PRODUCTION COST



The use of pressed steel parts in place of malleable iron, steel castings or drop forgings will lower production cost and decrease weight without lessening strength in any way.

There are many parts in a truck where this change can be advantageously made.

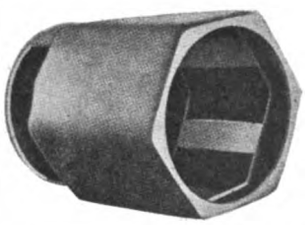
THE BOSSERT WAY

In the most modern plant which brains, money and experience can devise, we make over 200 pressed steel parts. Send us a sample of your spring hangers, running boards, brake drums or a score of other parts and our engineers will demonstrate to you an equal or better product at a lower cost.



The Bossert Company

Utica, N. Y.



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Carry on a Larger Business

FEDERAL-ize

Six Years of Success

From the little one-room building shown above to the immense modern factory shown below in six years is the record of the FEDERAL MOTOR TRUCK COMPANY.

Its sojourn in the small building was short because its success was sure and it soon outgrew the space.

Since then enlargements have been necessary each year until the FEDERAL FACTORY now occupies acres where it formerly covered feet.

The Fidelity with which each FEDERAL has been built since the first one has found favor with the business world. Dealers have approved of it and backed it with their confidence—the result has been—

FEDERAL SUCCESS AND AN INCREASE IN PRODUCTION OF 126% YEARLY

The modern merchant builds for tomorrow.

Store space is enlarged—sales men and women are trained to more efficiency—office methods are systematized—customer service is improved—no item of business building value is overlooked.

That is why the delivery service must be modernized to the minute.

The H. G. Seeger & Sons Furniture Company of Buffalo, N. Y., decided to try trucks for delivery and purchased a 1½-ton FEDERAL.

In one month this Federal made 107 trips, delivered home furnishings to 571 customers, a weight of 45,000 pounds, traveling over 960 miles.

This was all done at a cost including the driver's wages of $6.18 per day.

This is reasonable, every-day performance for Federals. They can do as much for your prospects.

Federal Traffic News, with records of FEDERAL Successes, Sent Monthly on Request.

The Federal Motor Truck Co.

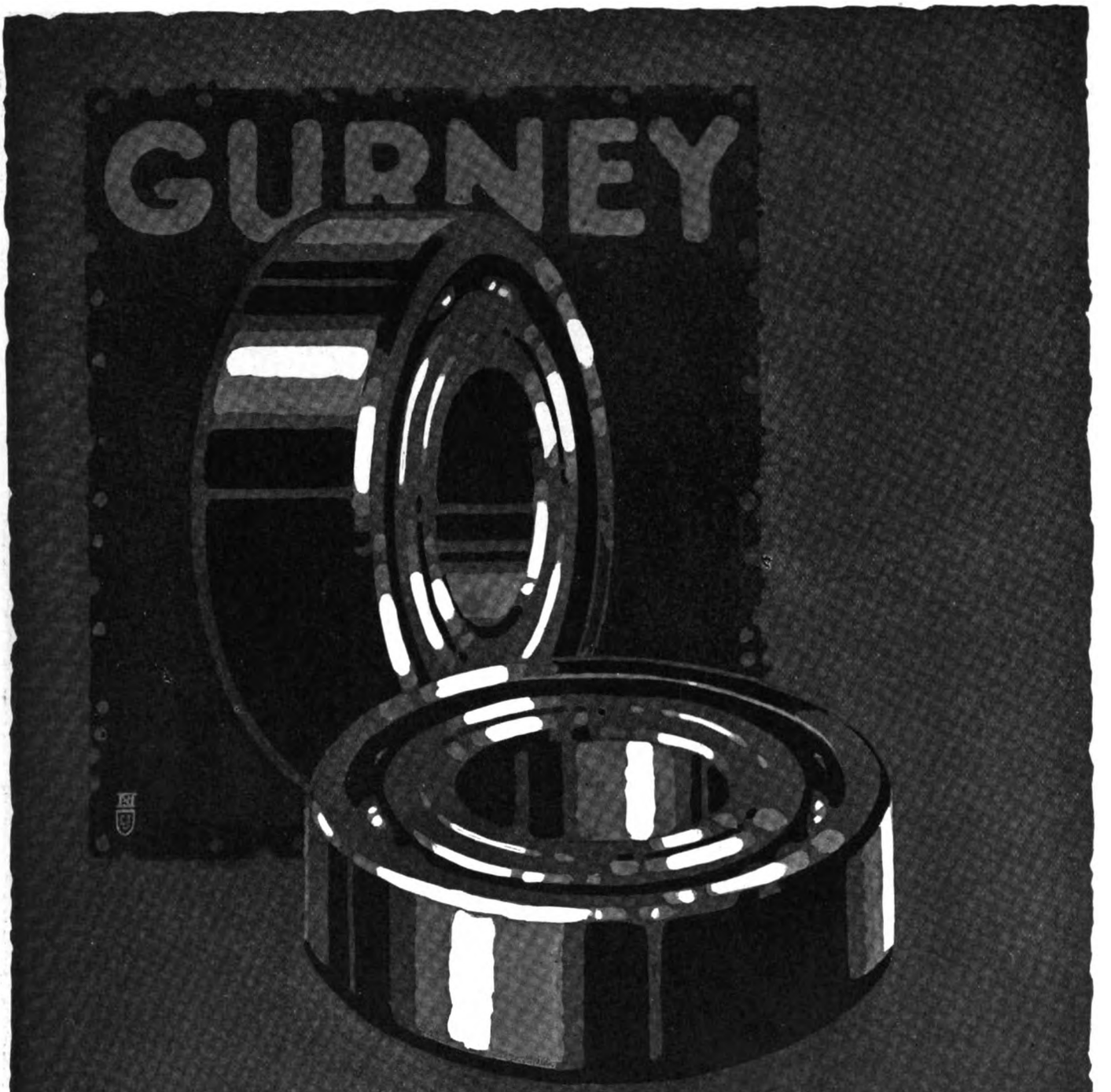
DETROIT, MICHIGAN



This is a 3½-ton FEDERAL Moving Van — Built to "Carry on a Larger Business" in Flint, Mich.



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ACCURACY!—

at 40,000 r. p. m.

Perhaps the strongest evidence of the almost perfect accuracy of the GURNEY Ball Bearing is shown in the performance of GURNEY Ball Bearings in a certain make of high speed grinding machines. In this particular mounting GURNEY Ball Bearings are called upon to perform under a shaft speed of 40,000 revolutions per minute—almost 15 times the average speed ever attained in any motor car part.

At this terrific speed, the slightest inaccuracy—even so much as the one-ten-thousandth part of an inch—would soon cause absolute disaster.

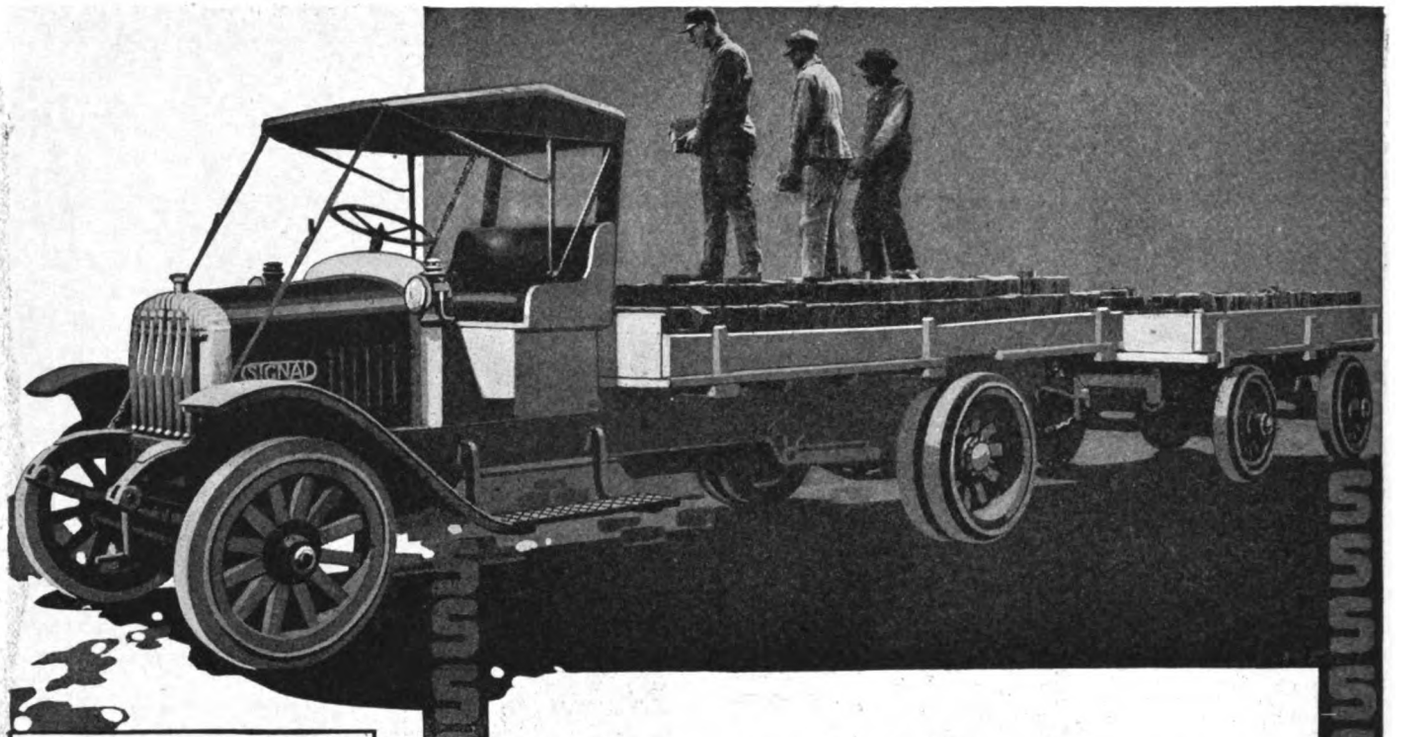
Yet the GURNEY Ball Bearings which are called upon to perform under these conditions are delivering the service.

GURNEY BALL BEARING COMPANY

Conrad Patent Licensee

Chicago, Ill. Jamestown, N. Y. N. Y. City

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SIGNAL
1-1½-2-3½&5 TON

Dealers

The Signal idea is to put the Service in the truck, where it belongs.

If this idea appeals our proposition will interest you immensely.

Worm drive only. 1½ tons to 5 tons.

"On the Job"—Always

A Motor Truck is like a man. You invest in it for what it *does* rather than for what it *is*.

And big business says there is no better man-quality than the ability to be always "on the job."

For precisely the same reason that a man is profitable for what he *does* rather than for what he *is* a motor truck pays a profit only when it is persistently and consistently "on the job."

It is because we deem the ability to be "always on the job" the most important asset a truck *can* have that we emphasize it in Signal *construction* even more strongly than in Signal advertising.

It would be extremely foolish to put it in the advertising and leave it out of the construction. That is why Signal employs such units as Continental Motor, Timken-David Brown axles, Brown-Lipe transmissions, and Detroit Self-Lubricating Springs.

If the Signal idea appeals to you as a truck buyer or dealer get in touch with us at once.

Signal Motor Truck Co.

DETROIT, MICHIGAN

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Each nationality has its admirable characteristics. They fuse and blend in America's great melting pot, and there emerges a new national type combining the excellences of all—the American.

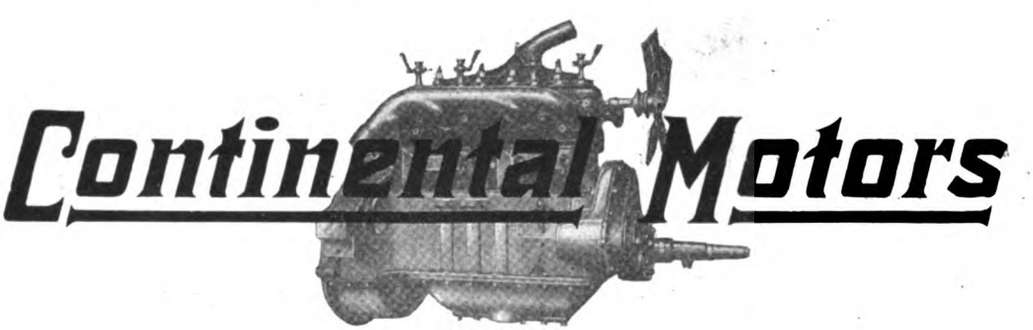
Motors are made in many lands, with characteristic features of design. France, England, Germany, Italy, America—each contributes, through its notable engineers, to the world's motor experience. By means of its customer-connections with over 150 manufacturers of automobiles and trucks in both Europe and America, the Continental Motors Company maintains unbroken communication with every reliable source of motor experience in the world.

Into the Continental crucible pours all this wealth of engineering achievement. Purged of dross, freed from all freakishness, refined and perfected by its own superb corps of engineering experts, there emerges that new type combining in standardized form the excellences of all—the world-famous Continental Motor.

CONTINENTAL MOTORS COMPANY

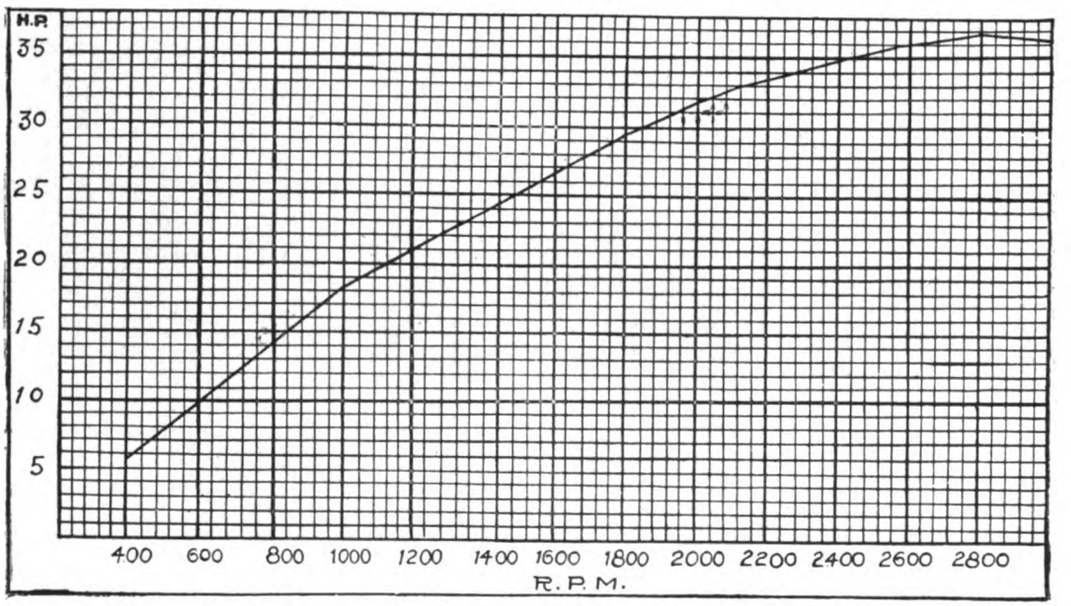
OFFICES: Detroit, Michigan
FACTORIES: Detroit, Muskegon

Largest exclusive motor manufacturers in the world



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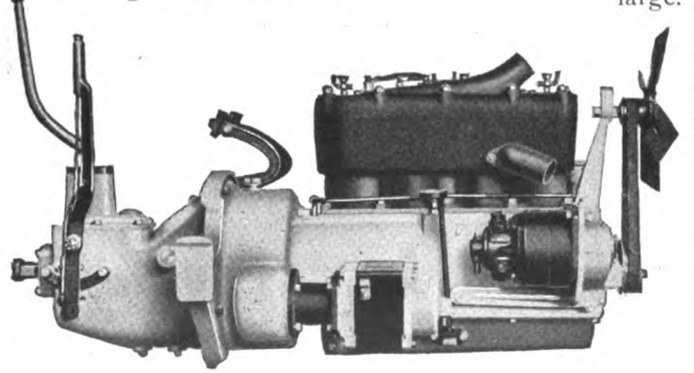
The Power Curve



G·B&S motor

THE illustration clearly indicates the power efficiency of G. B. & S. Motors.

Observe that this motor develops 22½ actual brake horse-power at 935 feet of piston speed per minute instead of at 1000 feet according to the S. A. E. formula.



At 2800 r.p.m. it develops 36.9 horse power. This power efficiency is backed by efficiency in every detail.

Cylinders are 3¾ in. bore x 4¾ in. stroke—cast en bloc with detachable cylinder head. Thermo-syphon cooled. There are three main bearings, all extra large. Valves are unusually large. Crankshaft is big and strong.

It requires only four bolts to install motor in chassis.

The "G. B. & S." motor is built for hard service and long life. It is adaptable to several varieties of transmissions—and provision is made for easy installation of standard starting and lighting systems.

We are furnishing this unit power plant for both pleasure and commercial cars—and have been building good motors for seven years.

We make this one size and style only, and thus are in a position to increase production rapidly.

Blue prints and full details gladly furnished on request.

Golden, Belknap & Swartz Co.

Detroit, Mich.

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FULLER TRANSMISSIONS

Efficiency & Silence

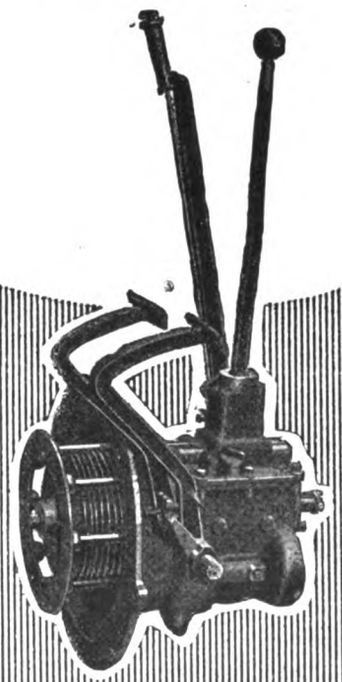
which are the essentials of modern transmission construction find their highest development in

FULLER Transmissions

This is one of the reasons that manufacturers of motor trucks have adapted our transmission as Standard and have found their judgment approved by thousands of satisfied owners and operators of their trucks.

Write us for particulars.

Fuller & Sons Manufacturing Co.
Kalamazoo, Mich.



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A 1 TON TRUCK with the Ford Cost of Upkeep—

$325

F.O.B. Detroit

56 or 64 INCH TREAD

Everyone knows the exceedingly low operating cost of the Ford and everyone is going to know how the "Tonford" truck unit attached to any Ford chassis, old or new, greatly reduces delivery costs—how it carries the same load more places, more quickly than any other one-ton truck and at much less operating cost.

The "Tonford" truck unit is built of the best materials. Its specifications compare most favorably with the best one-ton trucks—and you do not have to pay the original price of an ordinary one-ton truck, nor its higher maintenance cost.

Try It In Your Business

The "Tonford" truck unit has a wheelbase of 127 inches—longer than most trucks of similar capacity. It has a loading space of 9 to 11 feet back of the driver's seat and up to six feet wide, depending on the style of body. The heat-treated rear axle, 2⅛ x 2⅛, is guaranteed for one and one-half tons. Its roller bearings will carry 7500 pounds weight. Its wheels are heavy artillery type.

Make More Deliveries and Make Them Faster

The light, strong, easily handled "Tonford," with a special body adapted to your particular business, makes a marvelously cheap, effective form of delivery. Merchants find that the "Tonford" adds new customers, helps them to serve the old ones better at lower cost, is easy to operate, costs mighty little and is one of the best investments they can make. We recommend it to you. Let us give you the facts. Let us show you exactly what it will cost you to own a "Tonford."

The "Tonford" is easily attached to any Ford, old or new. Your Ford chassis is not mutilated. Only four-holes to drill in the frame. But, let us prove to you that the "Tonford" will make you money.

Dealers get our complete proposition. Write today

Detroit Truck Company, Mfrs.

Detroit

Merchants!

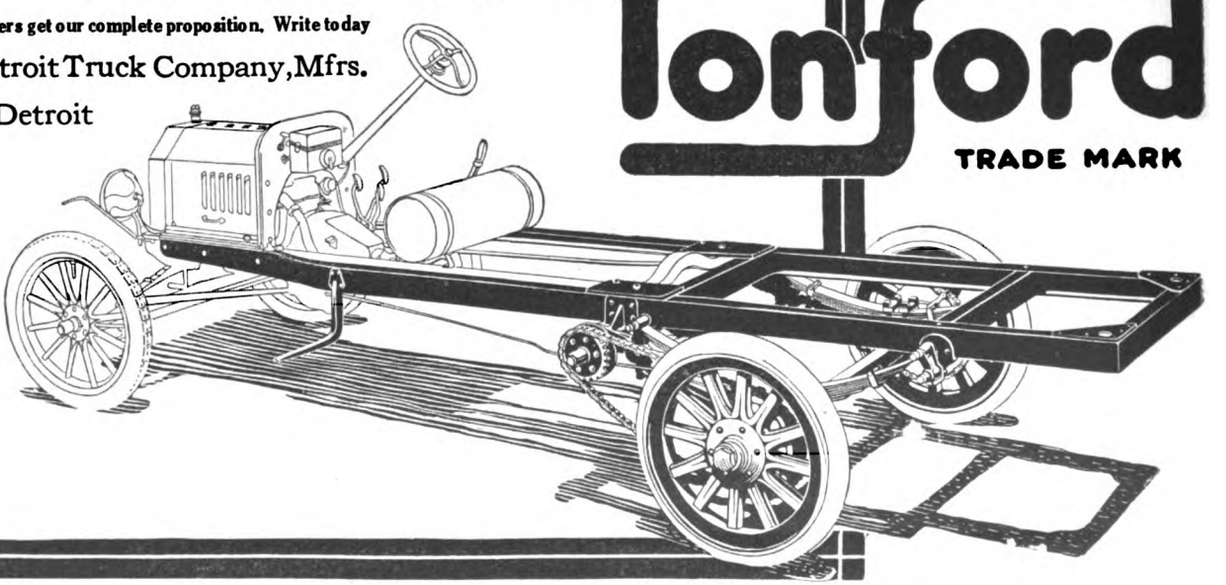
It matters not what line of business you are in, Motor Delivery is the thing. The "Tonford" is the most efficient form of motor delivery.

It costs little to buy and little to operate.

MADE IN DETROIT USA

Tonford

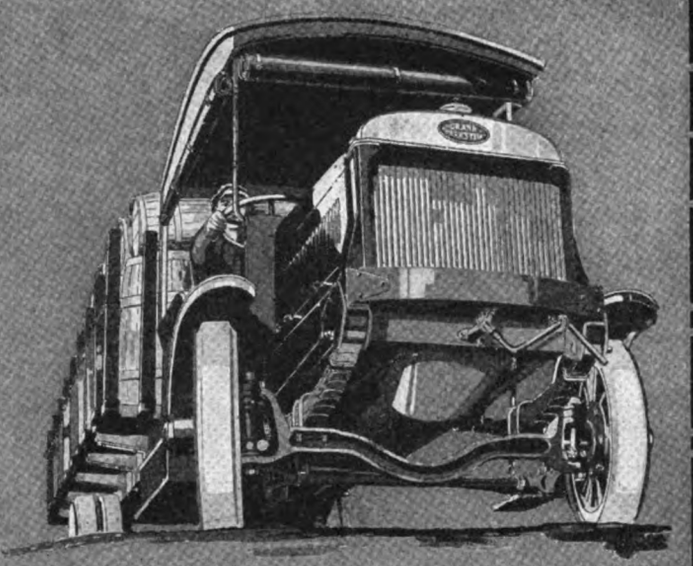
TRADE MARK



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GRAMM BERNSTEIN

Today Is the Day To Decide



Are You a Climber?

SOME men naturally like to be top-notchers, want the best that's going and we hope that type of man may see this message—we can boost him.

Naturally, he is aware of the tremendous strides the truck industry has taken in the past year—and he can read the handwriting on the wall and see what this next year holds in the way of big business expansion.

It's a Truck Epoch!

The dawn of a new era in the life of big business—one-half the world is at one another's throats, while the other half, our half, is engaged in a great work of preparation for present and future demands. It is up to you to share in this wave of prosperity. We are making a special proposition to men who are already in or wish to enter the greatest business of all—the selling of Gramm-Bernstein Trucks, the line that sells itself.

A Complete Line

It's a complete line—the small retailer and the great contractor or wholesaler—one truck or a fleet of trucks—a Gramm-Bernstein agent is ready to meet the demand of one and all—with a line comprising 1, 1½, 2, 2½, 3½, 5 and 6-ton trucks.

One name, one high standard of manufacture and the most generous, most profitable sales policy ever put up to any ambitious man or firm.

Tomorrow Never Comes

DON'T put this off till some other time—get this Gramm-Bernstein proposition now—a request for particulars through the coupon will open negotiations.

Then we can get together and come to a basis of agreement that will spell profit for both of us. Our extensive advertising is stirring up prospective buyers in all sections of the country, and it behooves us to both strike while the iron is hot.

Inquiries are soon turned into orders because our agents can meet any requirements in a truck. That's the tremendous advantage of a *full* line—nothing need get away.

We invite you to write, or wire for our special sales proposition to climbers. You can't keep a climber down—you know that!

The Gramm-Bernstein Company

Lima, Ohio U.S.A.

The Gramm-Bernstein Company
13 Gramm Boulevard
Lima, Ohio, U.S.A.

Please send me complete explanation of your new sales policy on Gramm-Bernstein Trucks, including reasons why it will pay me to handle the line; the advertising you will do for me in my local papers; the Dealer Sales Service, etc.

Name_____

Street and Number_____

City_____ State_____

I (am / am not) representing a truck at the present time.

If you are representing a truck at present, please give the name of it here.

_____

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A Better Truck is not for Sale!

WHEN the enthusiastic representative of a motor truck manufacturer tells you that his line is better than the Bessemer, well, he's mistaken!

A better truck is not for sale. Money can't buy higher quality than is built into

THE BESSEMER LINE

With component parts made by the acknowledged leaders of the truck industry, our experienced designers have conceived and caused to be built a rugged, dependable truck, simple in construction, powerful, economical in first cost and operating expense and efficient in service even when driven by unskilled or careless drivers.

For Contractors and Merchants

these trucks offer the means of lowest cost transportation. They are light without having strength sacrificed, strong without being clumsy, simple without economizing on essentials.
At their respective prices our various models offer the fullest values for like capacities. We are more than ready to enter at any time, in any place, for any service, a series of competitive tests and to accept the verdict of the unbiased prospective purchaser.

One-Ton	Two-Ton	Three-and-One-Half-Ton
Internal Gear Shaft Drive	Worm Drive	Worm Drive
$995	$2200	$3100

DEALERS—Write us NOW for our liberal selling plans. We give interested factory co-operation and enterprising aid to our dealers.

All inquiries regarding territory in New England, Eastern New York, Eastern Pennsylvania, New Jersey, Delaware, Maryland, Virginia and District of Columbia should be addressed to our Eastern distributors:

Bessemer Motor Truck Corporation

Lexington Avenue and E. 42nd Street NEW YORK CITY

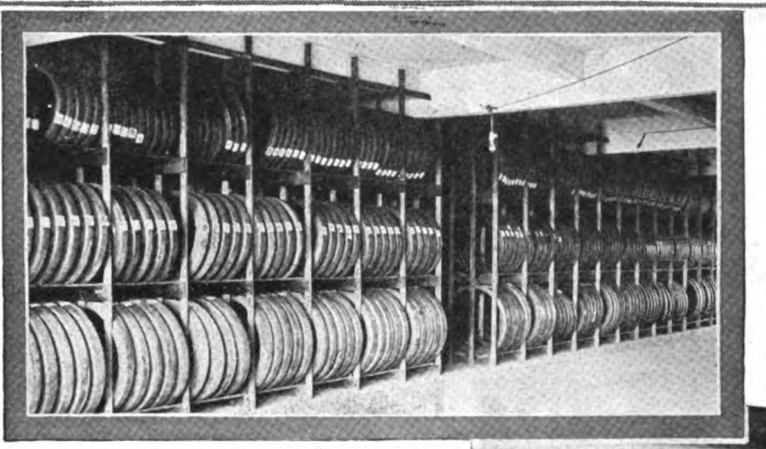
All other inquiries to

BESSEMER MOTOR TRUCK COMPANY : GROVE CITY, PA.

BESSEMER

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A typical Goodrich stock room. This method of racking is gradually replacing other arrangements for keeping stocks fresh and readily accessible.



Below, a 150-ton hydraulic forcing press for applying pressed-on solid truck tires in a Goodrich service station.



GOODRICH
TRUCK TIRE
SERVICE POLICY

—The Service Division of our Truck Tire Department is the most efficient and highly specialized organization, of its kind in the United States. Its policy involves the following factors:

1. ***Ample stocks.*** Your size always on hand.
2. ***Complete shop equipment.*** Hydraulic presses, chain hoists, drill presses and other modern mechanical devices.
3. ***Intelligent workers.*** Men trained to use their heads as well as their hands.
4. ***Prompt and courteous treatment.*** Appointments by 'phone. No delays. Promises kept. Satisfied customers.

Test this policy at our nearest service station.

Service Stations and Branches in All Important Trucking Centers.

THE B. F. GOODRICH CO., Akron, Ohio

Makers of the Celebrated Goodrich Automobile Tires—*"Best in the Long Run."*

One Thousand Miles on High Gear

OVERLOADED 20 PER CENT.

Every hill on this route through Ohio and Michigan was taken on high without straining. Read the story in our booklet "The Wizard of Trucking." Only a Six and only a "Globe" could do it on 12½ miles per gallon of gas.



Six Cylinder Motor

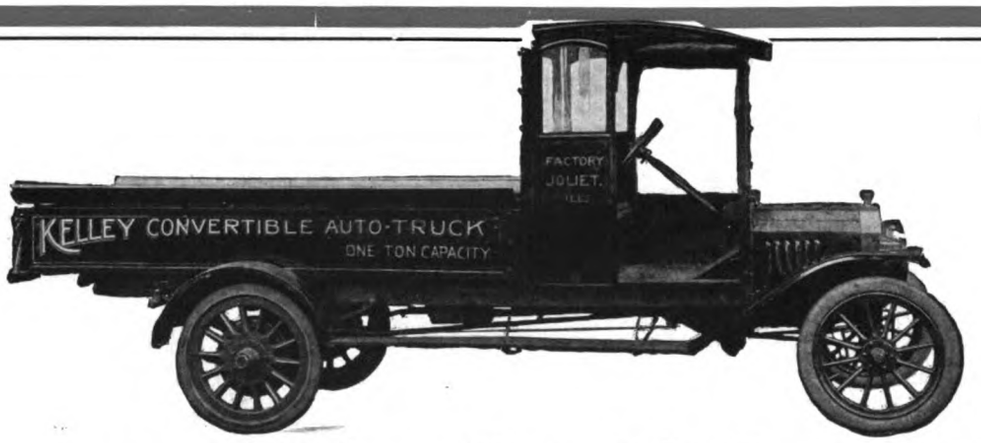
trucks handle like a pleasure car. Start easier. On high 1½ miles to 25 miles per hour. 11 to 15 miles per gallon of gas. Quieter operation. Minimum motor vibration. Go anywhere, any roads, any time. Agencies being established rapidly. Write today.

MFG. BY,

THE GLOBE MOTOR TRUCK CO.

NORTHVILLE, MICH.

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Price
$385

Guaranteed
STANDARDIZED
COMPLETE
ECONOMICAL

Internal
Gear
Drive

An Established Success For Big Winter Business

The rapidly increasing demand and the natural adaptability of the KELLEY Convertible Truck Attachment for winter service, makes it one of the biggest sellers to winter prospects. When horses can't keep their feet, the KELLEY Convertible Truck Attachment and a Ford chassis are light enough to "stay on top"—heavy enough to go where they're going every time.

KELLEY Convertible Truck Attachment Is More Efficient—Cheaper Than a Team

—when you hitch it up to the business end of a Ford car.

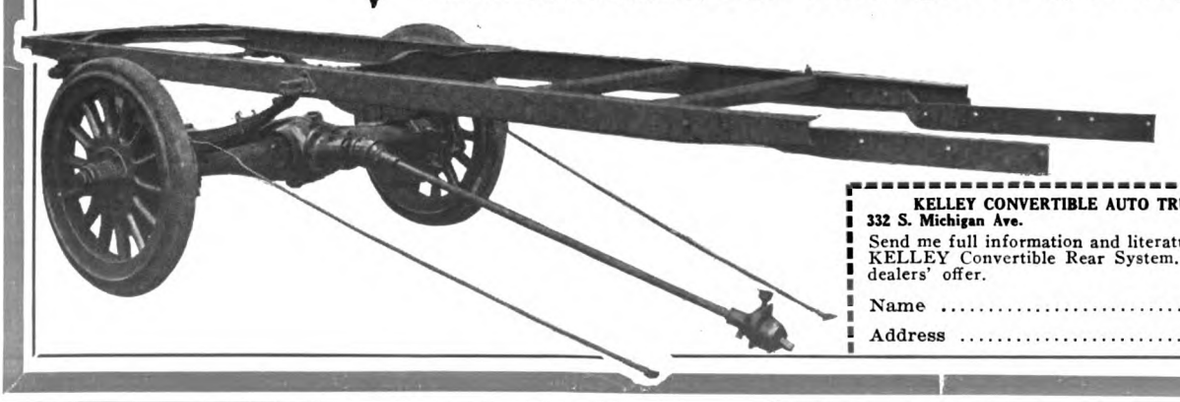
KELLEY dealers are making good everywhere—turning in orders that are velvet, over and above profits of a year ago. And they are planning to double their KELLEY business before spring.

The KELLEY Attachment, plus a Ford chassis, has no superior in the one-ton truck field. But it has the definite advantage of better construction, INTERNAL GEAR DRIVE, prompt deliveries and terms that suit.

Use The Coupon Now

Some choice territory with ready-made sales and good-sized profits is still waiting for KELLEY representatives. Get our liberal dealer's offer. It has made the KELLEY Convertible Truck Attachment *an established success.* USE THE COUPON NOW.

KELLEY CONVERTIBLE AUTO TRUCK CO.
Factory, Joliet, Ill.
Executive Office, 332 S. Michigan Ave., Chicago, Ill.



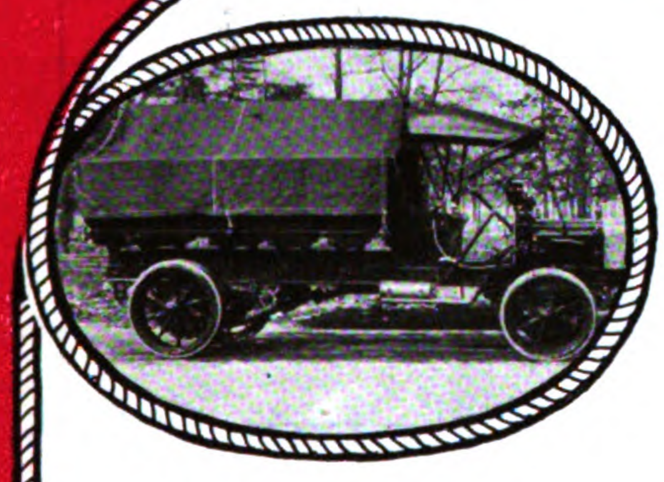
KELLEY CONVERTIBLE AUTO TRUCK CO.
332 S. Michigan Ave. Chicago, Ill.
Send me full information and literature describing KELLEY Convertible Rear System. Also liberal dealers' offer.
Name .....
Address .....

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WEST'S CAST STEEL WHEELS

ARE NOW IN USE BY

23



Here are some of the . . .

—of the most prominent Truck and Trailer Manufacturers in the United States.

They are real Bessemer steel —not iron—wheels. And don't forget that this makes a big difference.

They are the lightest and strongest wheels made

They are practically indestructible and could be broken only by an impact sufficient to wreck the truck itself.

Hubs are cast integral with the wheel and they are designed for use with either pressed on or demountable type of tires.

None—so far as we know—has ever failed. And over 25,000 of them are now in use.

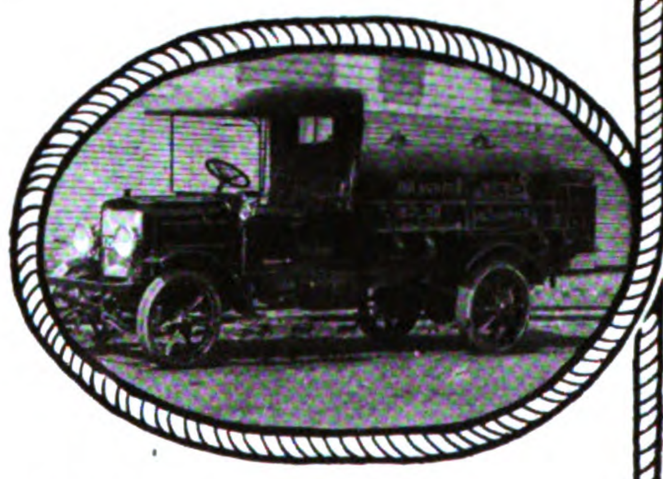
We guarantee them absolutely.



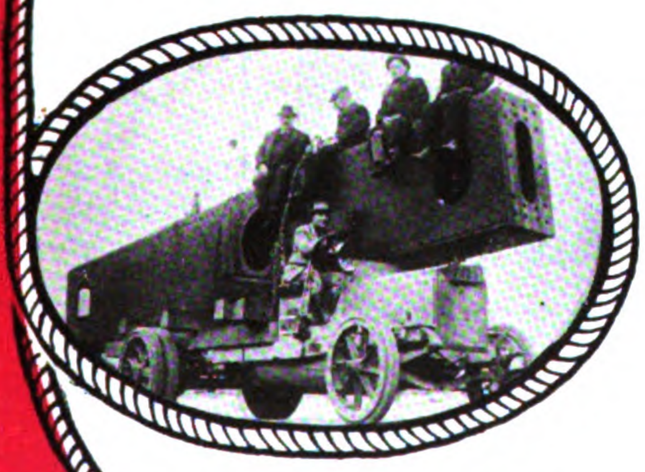
work of different kinds . . .



best known makes of trucks . .



and all of them using . . . .



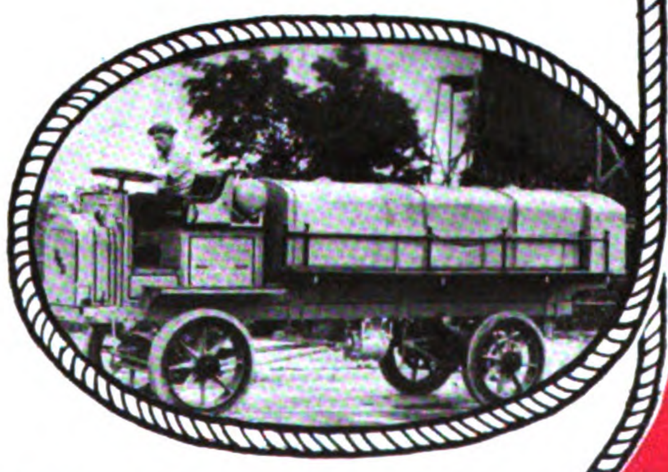
employed on heavy duty . . .

THE WEST STEEL CASTING COMPANY

805-815 E. 70th Street, CLEVELAND, OHIO

"Watch the West Cast Steel Wheels go round".

Get in this Line



West's Cast Steel Wheels.

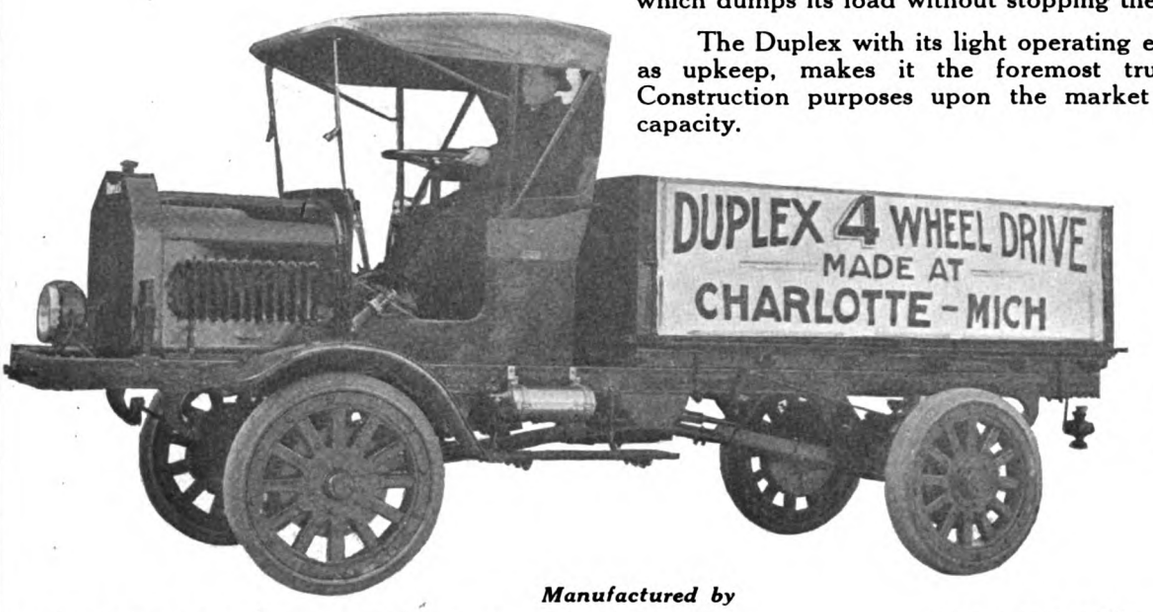
DUPLEX 4 WHEEL DRIVE

THE TRUCK OF EARNING EFFICIENCY

This cut represents the Duplex 4-Wheel Drive Road Truck, and is one of many others hauling one hundred and fourteen yards of gravel every twenty-four hours, a distance of 7.7 miles and at $1.00 per yard, earns $114.00 per day.

This truck with trailer has Duplex Side Dump Body which dumps its load without stopping the truck.

The Duplex with its light operating expense as well as upkeep, makes it the foremost truck for Road Construction purposes upon the market regardless of capacity.



Made in two-and three-ton capacity

Manufactured by

DUPLEX POWER CAR CO., Charlotte, Mich.



The Great Factors in Hauling

—Continuous Operation—Low Maintenance Cost—Maximum Mileage—

Firestone

Truck Tires

—of any kind on any vehicle—make it give better results with longer life and lowest expense per mile. Write for details of the right Firestone Equipment for all roads, loads and conditions.

Firestone Pressed-On Tires are applied under enormous pressure at any Firestone Service Station. Write for further particulars and dealer co-operation.

Tires for Trailers

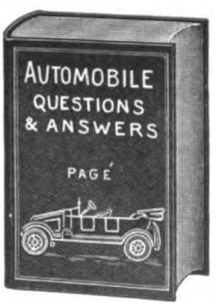
Every type—heavy and light—brought to highest degree of perfection. See the Firestone service man.

Firestone Tire and Rubber Company
"America's Largest Exclusive Tire and Rim Makers"
Akron, Ohio—Branches and Dealers Everywhere

New 1916 Edition of Questions and Answers

By Victor W. Page, M. E.

$1.50



$1.50

On Modern Automobile Design, Construction, Driving and Repair

Just off the press. A practical self-educator, consisting of 37 progressive lessons. Contains over 600 pages. Profusely illustrated with photographs and drawings of practical working parts. Includes all the 1916 developments.

Sent prepaid to any address on receipt of price.

Book Dept., The Commercial Vehicle
239 West 39th St., New York

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International Motor Trucks



The Leader in Volumes of Sales and a Profitable Line to Sell

Because of its successful record, the International is the truck to sell. A contract for the International carries with it the prestige of selling the most widely known truck on the market.

International Motor Trucks are built in sizes and styles to meet the requirements of over eighty per cent of motor truck buyers. No truck is better built or suited to a wider market. They are backed by a Company of undoubted financial responsibility, assuring the dealer a permanent business.

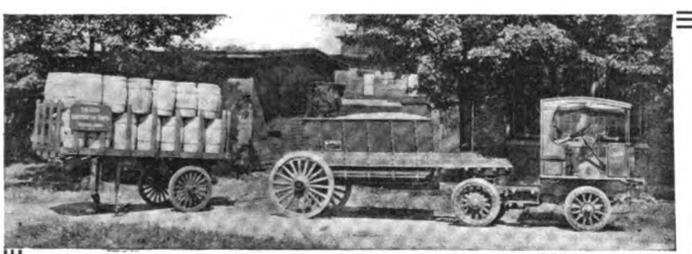
Here is a motor truck for which there is already an established demand, which for years has led all others in numbers sold; which sells at a reasonable price, and carries a satisfactory margin of profits. What more can a prospective dealer ask?

Write for our Liberal Terms—Dealers who sell International Motor Trucks are assured not only of a wide and firmly established market and of efficient sales help, but also of a satisfactory margin of profit. Our terms, which are exceedingly liberal, will be sent on request together with other information about the contract. The best territories are being taken fast. Better write or wire us at once.

Motor Truck Department

International Harvester Company of America

88 Harvester Building (Incorporated) **Chicago, U. S. A.**



Keep Your Motor Busy

That's the secret of making motor equipment pay. With

THE 100% WATSON

Five Ton Tractor and Trailer

it's an easy thing to keep your motor busy. An extra trailer unit or two, designed to suit your different jobs, will enable you to fit in on almost any haulage job at a moment's notice. There's no need of an extra motor—just a trailer unit does it. No special equipment needed in changing trailers—not even a set of bolts to adjust.

Our new catalog, just off the press, will explain other features—short turn—bottom dump—special engine spring suspension—that make the "100% WATSON" the one real buy for the contractor.

Send for catalog *now* while you think of it.

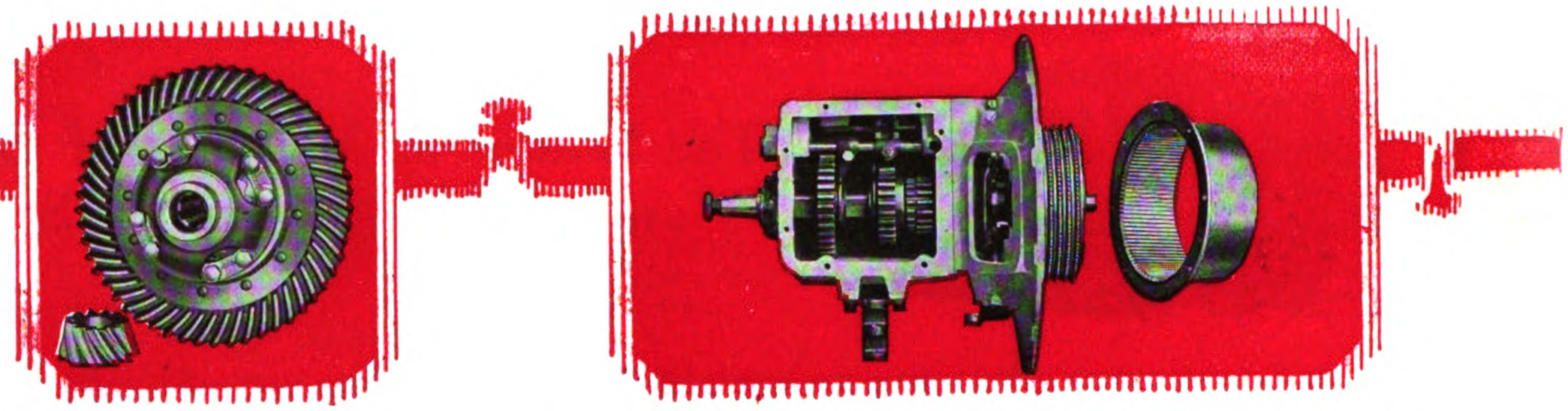
WATSON WAGON CO.

The World's Largest Builders of Dumping Wagons

28 W. Center St. - - Canastota, N. Y.

W-8

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Here Is the List of Users of Brown-Lipe Products Which Tells the Brown-Lipe Story Better and More Forcibly Than Words.

This Splendid Array of Motor Car and Motor Truck

BROWN

Abbott Motor Car Co.
Acason Motor Truck Co.
Acme Wagon Co.
Ahrens Fox Eng. Co.
Amboy Motor Truck Co.
American Express Co.
Anderson Elec. Car Co.
Armleder, O. Co.
Atlantic Elec. Vehicle Co.
Atlantic Refining Co.
Atterbury Motor Car Co.
Auburn Automobile Co.
Auto Car Co.
Auto Construction & Eng. Co.
Available Truck Co.

Baker, R. & L. Co.
Barker, C. L.
Barley Mfg. Co.
Bartholomew Co.
Bessemer Motor Truck Co.
Bowling Green Motor Truck Co.
Brockway Motor Truck Co.
Buick Motor Co.

Cadillac Auto Truck Co.
Cadillac Motor Car Co.
Case T. M. Co., J. I.
Chandler Motor Car Co.
Chase Motor Truck Co.
Chester County Motor Truck Co.
Chevrolet Motor Co.
Chicago Pneumatic Tool Co.
Cole Motor Car Co.
Coleman Carriage Co.
Columbia Taxi Cab Co.
Commerce Motor Car Co.
Corbitt Automobile Co.
Crawford Automobile Co.
Croce Auto Co.
Crossley Motors, Ltd.
Crow Motor Car Co.
Cunningham, Jas. & Son Co.

Daniels Motor Car Co.
Dart Motor Truck Co.
Davis Car Co.
De Kalb Automobile Co.
Detroiter Motor Car Co.
Detroit-Wyandotte Motor Co.
Diamond Motor Car Co.
Doane Motor Truck Co.
Dorris Motor Car Co.
Dort Motor Car Co.
Duplex Power Car Co.

Eclipse Motor Truck Co.
Empire Automobile Co.
Enger Motor Car Co.

Federal Motor Truck Co.
Fiat Co.
Fifth Ave. Coach Co.
Four Wheel Drive Auto Co.

Gabriel C. & W. Co.
Garford Motor Truck Co.
General Motors Truck Co.
General Vehicle Co.
Gramm-Bernstein Co.
Gramm Motor Truck Co.
Grant Motor Co.

Hahn Motor Truck Co.
Harding Motor Truck Co.
Harvey Motor Truck Works
Harwood Barley Mfg. Co.
Haynes Automobile Co.
Henderson Bros.
Hendrickson Motor Truck Co.
Hudson Motor Car Co.
Holmes Motor Truck Co.
Hurlburt Motor Truck Co.
Hupp Motor Car Co.

International Harvester Co.
International Motor Co.

Jackson Auto Co.
Jordan Motor Car Co.

Kelly-Springfield Motor T. Co.
King Motor Car Co.
Kissel Motor Car Co.
Kleiber & Co.
Knox Motors Associates
Krebs Commercial Car Co.

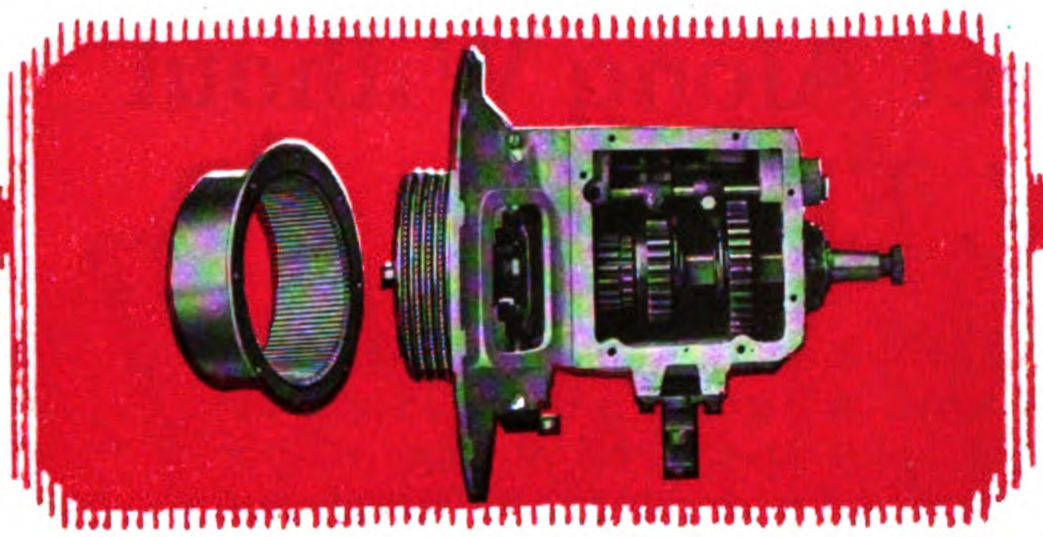
Landshaft Motor Truck Co.
Lewis-Hall Iron Wks.
Lexington-Howard Co.
Lippard-Stewart Motor Car Co.

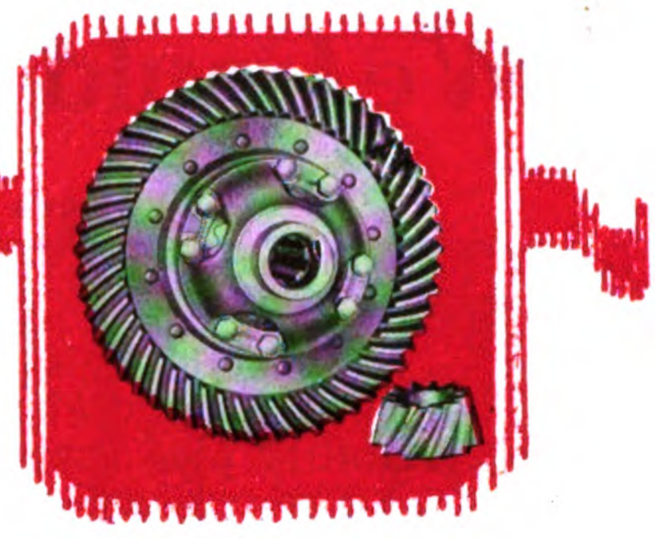
BROWN-LIPE GEAR CO. Syracuse, N.

Transmissions

NEW YORK, Thos. J. Wetzel, 29 West 42d St.
SAN FRANCISCO, A. H. Coates, 444 Market St.
CHICAGO, K. Franklin Peterson, 122 S. Michigan Ave.
DETROIT, L. D. Bolton, 2215 Dime Savings Bank Bldg.
Foreign Agent Benjamin Whittaker, 2, Norfolk Street, Strand, LONDON, W. C.

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Manufacturers Use Brown-Lipe Products Because of Their Quality, Frequently Paying Higher Prices for in the Long Run Higher First Cost Represents Actual Economy.

-LIPE

Lozier, H. A. Co.
Luverne Auto Co.

McFarland Motor Co.
Maccar Truck Company
Martin Carriage Wks.
Mercer Automobile Co.
Meteor Motor Car Co.
Milburn Wagon Co.
Mitchell Motor Car Co.
Moline Automobile Co.
Monroe Motor Co.
Moon Motor Car Co.
Moreland Motor Truck Co.
Motor Trucks, Ltd.
Mutual Motors Co.

National Motor Vehicle Co.
National Steel Car Co.
Nelson & Le Moon
New England M. T. Co.
Niles Car & Mfg. Co.
Nordyke & Marmon Co.

Oakland Motor Car Co.
Ohio Electric Car Co.
Old Reliable M. T. Co.
Olds Motor Car Co.
Owen-Schoenack Co.

Paige-Detroit Motor Car Co.
Palladium Auto Cars, Ltd.
Palmer-Moore Co.
Palmer-Myer Co.
Pathfinder Co.
Paterson Co., W. A.
Peerless Motor Car Co.
Poyer Co., D. F.
Pullman Motor Car Co.

Republic Motor Truck Co.
Riddle Coach & Hearse Co.
Ross Automobile Co.
Rowe Motor Mfg. Co.
Rush Delivery Car Co.

S. G. V.
Sandow Motor Truck Co.
Sanford Motor Truck Co.
Schacht Motor Truck Co., G. A.
Schafer-Decker Co.
Scripps-Booth Co.
Selden Motor Vehicle Co.
Service Motor Truck Co.
Shaw, Walden W. Livery Co.
Signal Motor Truck Co.
Singer Motor Co.
South Bend M. C. Wks.
Standard Oil Co.
Standard Steel Car Co.
Standard Motor Truck Co.
Stegeman Motor Car Co.
Sterling Motor Truck Co.
Stewart Motor Corp.
Stutz Motor Car Co.
Sullivan Motor Car Co.

Tait Bros.
Taxicab Service Co.
Thomas Auto Truck Co.
Tiffin Wagon Co.
Trabold Truck Mfg. Co.
Trafford Eng. Co.
Transport Tractor Co.
Tower Iron Wks. R. J.

U. S. Carriage Co.
U. S. Motor Truck Co.
United Motor Co.

Velie Motor Vehicle Co.
Vim Motor Truck Co.

Walker Vehicle Co.
Ward M. V. Co.
Watson Wagon Co.
Way-Cleanse Co.
Westcott Motor Car Co.
Wichita Falls Motor Co.
Wilcox Motor Co., H. E.
Willingham S. Sons. E. G.
Winton Motor Car Co.
Witt-Will Co.

Yellow Cab Co.

Zeitler & Lamson

Y., U. S. A. BROWN-LIPE CHAPIN CO.

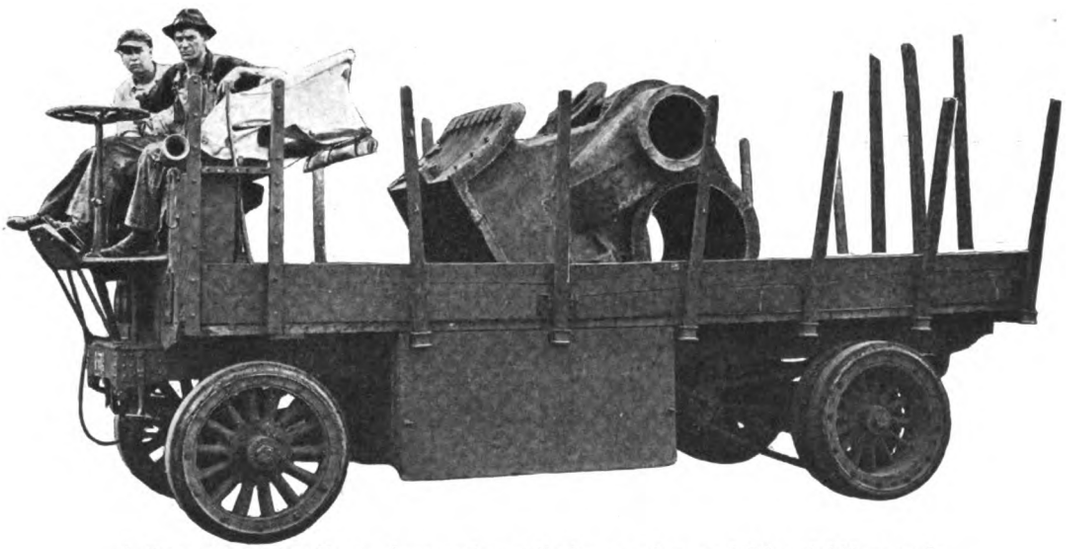
Differentials

NEW YORK, Thos. J. Wetzel, 29 West 42d St.
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"We Could Not Get Along Without (Our) G. V. Electric"

In a motor truck **DEPENDABILITY** is more important than first cost, speed or operating cost. But when you get in a G. V. Truck dependability **plus** reasonable first cost, plus speed and mileage ample for a big day's work, at an operating cost far under that of the gasoline truck, let alone horses—why hesitate to do as other discriminating firms have done? The Electric **ABSOLUTELY OUTCLASSES** other forms of city delivery.



A 5-ton G. V. hauling a locomotive cylinder casting, weighing 9,830 pounds.

General Vehicle Company, Inc., *Fort Wayne, Ind., July* 6, 1916.
No. 612 *Otis Building, Chicago, Illinois.*

Gentlemen:—Your favor of the 5th instant, inquiring about our experience with the 5-ton General Vehicle Truck which we purchased of you about four years ago, is received. The service the truck has given us has been entirely satisfactory. It has been in daily use during the period named and is still in excellent condition. Briefly, we could not get along without it.

Yours respectfully,
(Sgd.) C. T. STRAWBRIDGE,
Vice-President.

Catalog 73 on request

GENERAL VEHICLE COMPANY, Inc.

General Office and Factory: Long Island City, N. Y.
NEW YORK CHICAGO BOSTON PHILADELPHIA

Six Models: 1,000 to 10,000 pounds capacity. Dealers in open territory are invited to correspond

16109

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WARNER

GEAR COMPANY OF MUNCIE



Warner Truck Transmissions

A Mark of High Quality and Long Service In Any Motor Truck

TRANSMISSIONS · CLUTCHES STEERING GEARS · DIFFERENTIALS

WARNER GEAR COMPANY, Muncie, Indiana

Detroit Office, 967 Woodward Ave.

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"Giving Satisfactory Service And Has Covered Ground For Which It Was Purchased To Our Entire Satisfaction."

The Coca-Cola Company.

ATLANTA, GA.

Here is a concern which obviously must have truck service that is unfailing.

That the Coca Cola Company is thoroughly satisfied with the service COMMERCE trucks are giving them is shown conclusively in their letter to us, an excerpt from which is shown in the heading above.

When you can refer customers to concerns like the Coca Cola Company with a certainty that they will put their stamp of approval on COMMERCE trucks, don't you think that the construction of the truck itself and its performance has gone a long way to help you make sales?

And when you have thousands of just such satisfied owners to whom you can refer your prospects, surely you are cutting down your selling effort to the minimum.

In addition to furnishing you a truck that sells easily, and stays sold, we have also adopted a plan that provides for financing

COMMERCE MOTOR CAR COMPANY, Detroit,

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Commerce

1500 POUNDS CAPACITY

TRUCKS

$975 Complete

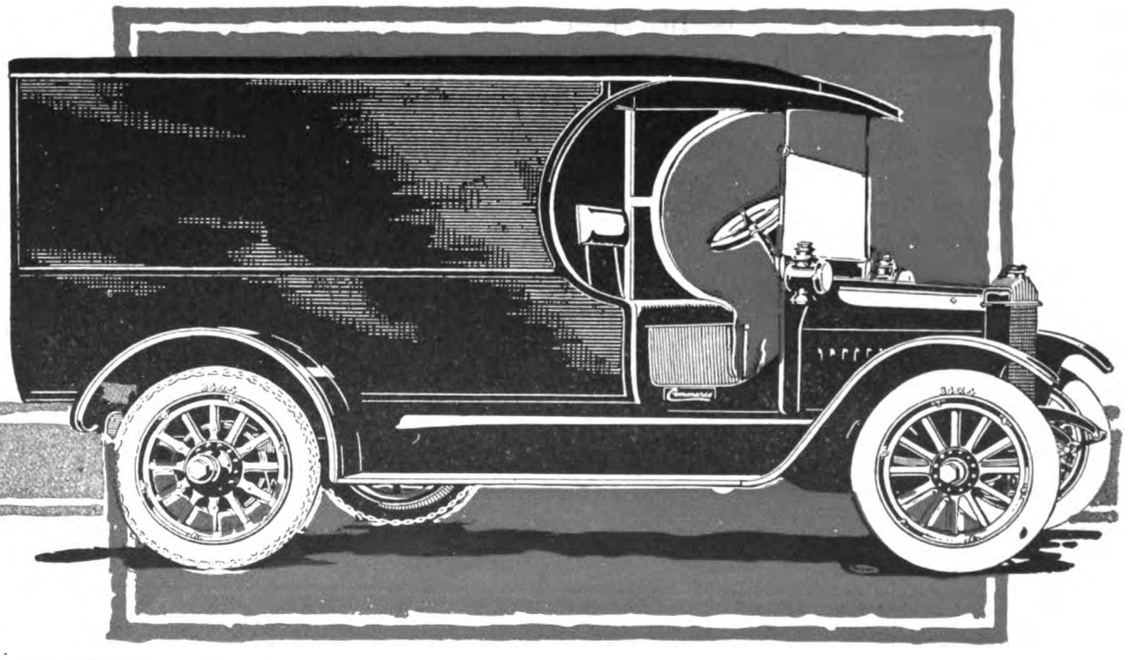
Choice of 3 Bodies

deferred payment sales, without the payment on the part of the dealer of any commission or brokerage fees, and this plan also enables the dealer to carry a large stock of trucks if he so desires, at a minimum cost to him. We can put you in touch with hundreds of dealers and thousands of consumers who will bear out our enthusiasm over the COMMERCE proposition, and on that basis we are looking for real dealers who can qualify.

Let us hear from you immediately—before your territory is filled.

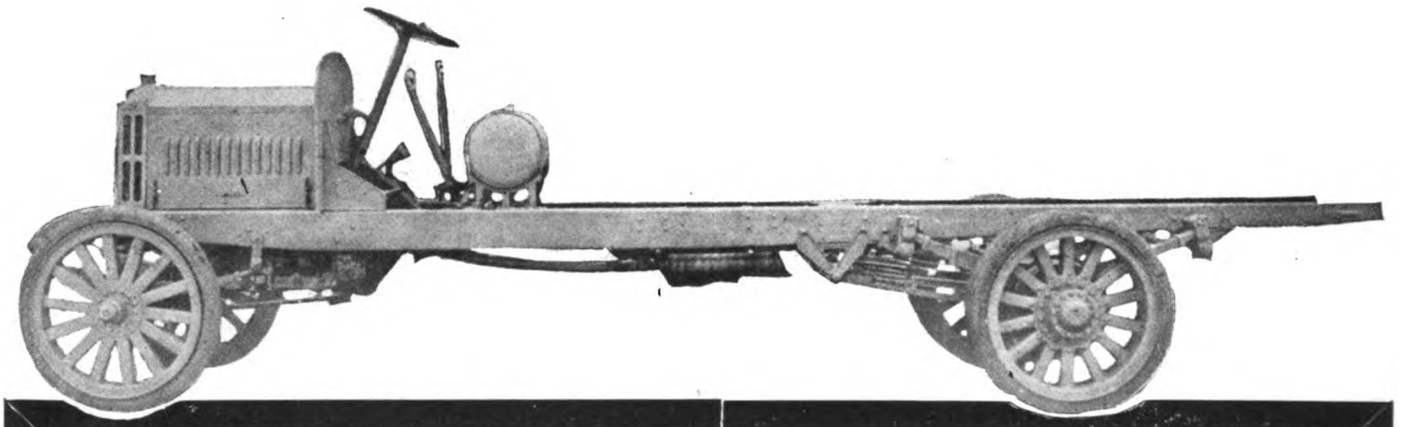
COMMERCE trucks are rated at 1500 pounds' capacity, and sell for **$975.00,** with a choice of three bodies: Model NC—with body design for grocery, department stores, etc.; Model NH—with standing top and waterproof curtains; Model NA—with open express type body.

All **COMMERCE** trucks are equipped with Continental motors, Eisemann magnetos, cast tank radiator, three-quarter floating rear axle with nickel shafts and bearings.

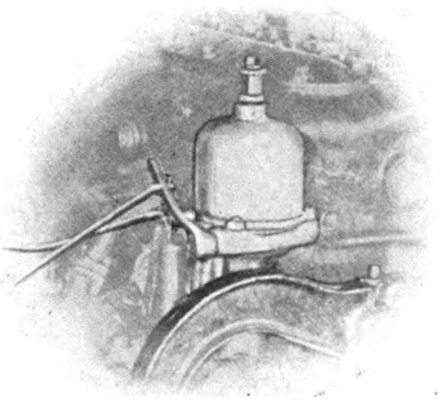


Michigan

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The Successful Motor Truck



in which are combined
Simplicity, Low Maintenance, Efficiency and Reliability.

Guaranteed by manufacturers with 16 years' experience in motor vehicle construction.

A simple, powerful Continental Motor furnishes the power which is transmitted through a Timken-Brown Worm Drive to the wheels. The cooling is affected by a Renault type radiator. Fuel economy is obtained by a Special KREBS Carburetor.

The KREBS Automatic Governor is a positive control by which the owner regulates the speed of the vehicle, it cannot be altered by the operator.

Any man who can steer can operate a KREBS. Mechanic-chauffeurs are not required as drivers. This is but one of the reasons for its economical operation.

Krebs

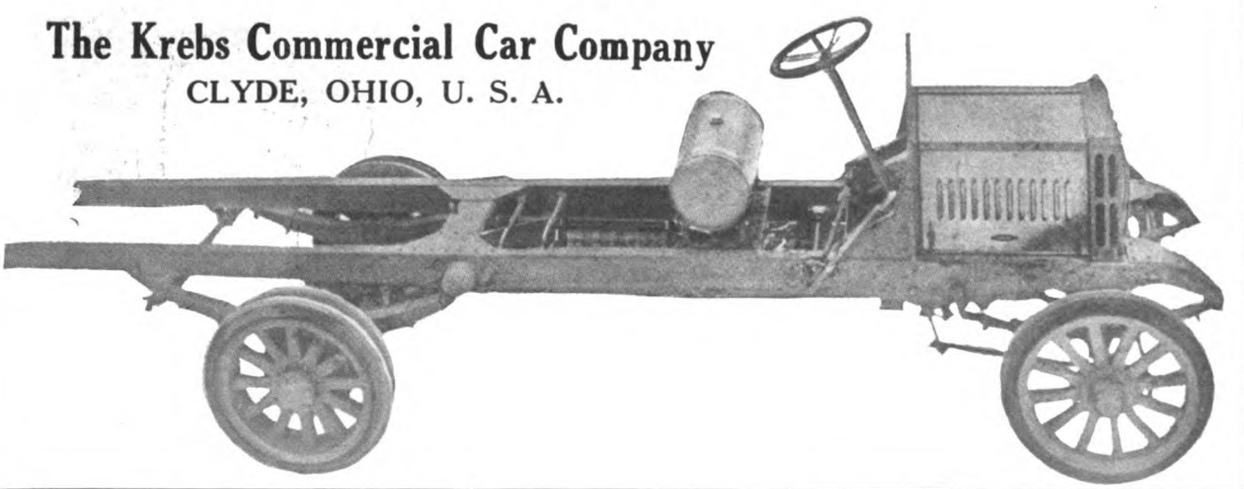
Send for the KREBS catalog. It contains statements of guaranteed facts which you should know before buying any truck

KREBS are made in ¾, 1, 2 and 3-ton capacities.

Any style body for any business requirement.

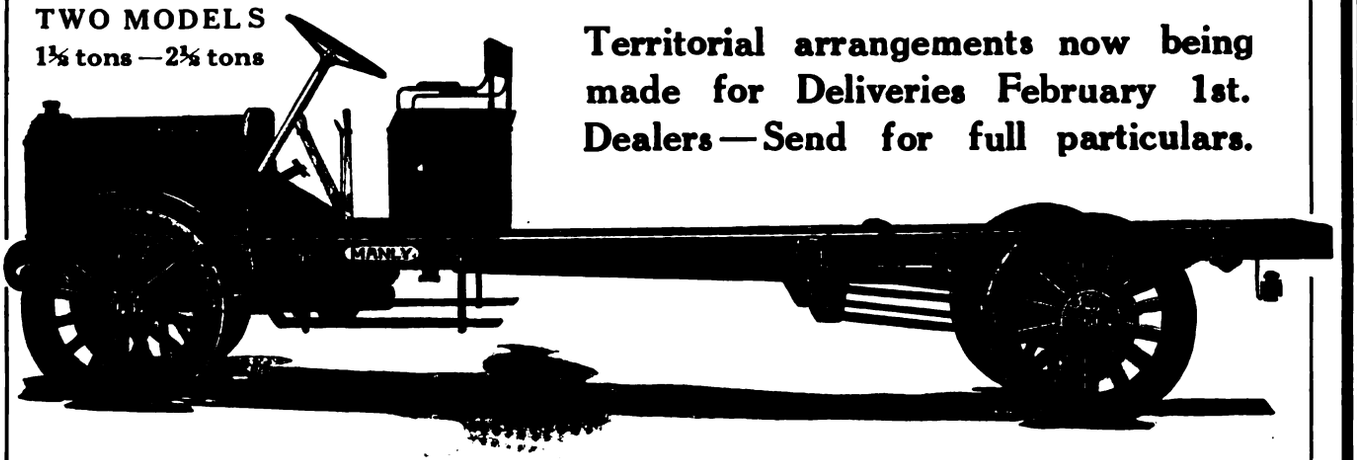
Write now.

The Krebs Commercial Car Company
CLYDE, OHIO, U. S. A.



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TWO MODELS
1½ tons — 2½ tons



Territorial arrangements now being made for Deliveries February 1st. Dealers — Send for full particulars.

24 MANLY FEATURES

1. Engine torque that takes truck anywhere.
2. Built-in governor.
3. Manifold design that burns any fuel.
4. Vacuum fuel feed increasing economy 15%.
5. Radiator guaranteed for life of truck—carried in cast iron shell on flexible 3-point support.
6. Fan mounting that makes even suction over whole radiator.
7. Control that maintains road speed without constant adjustment of throttle and spark.
8. Front spring suspension that prevents wheel wobbling and tire wear, jerkiness of the hand wheel and breaking strains on steering parts.
9. Balanced steering gear without thrust loads or thrust bearings.
10. Brakes unaffected by rough roads or change in load. Operation through equalizers with over 500 square inches of surface.
11. Clutch that engages smoothly, no matter how quickly foot is removed from pedal. Has 840 square inches of surface and an accessible external adjustment.
12. Individual jaw clutch transmission that engages easily regardless of truck or engine speed.
13. Gear ratios that give good road speed without racing the engine when running long distances in second; that give a pull equal to that of a four-speed gearset in low and that give an emergency leverage in reverse of 52 to 1.
14. Universals that do not wear and require no oiling.
15. Worm drive.
16. One-piece rear axle guaranteed for a load on the rear tires alone which is greater than the pay load of the truck.
17. Driving system that takes all driving and torsion load off springs, stops motion of universals, prevents false movement of the driving gears and has no bending loads.
18. Frame 6 inches deep.
19. A starting and lighting installation that avoids 90% of chances for trouble.
20. Double row radial and thrust annular ball bearings throughout.
21. Every part made according to sizes, specifications and material analyses adopted by the S. A. E.
22. Not a single point for either lubrication or adjustment underneath the body space.
23. Ignition system without low tension wiring and with only four leads on whole car.
24. Springs without center bolts.

Announcing the

MANLY TRUCKS

—a line of new idea trucks embodying invaluable and unique constructional features which from a service as well as a selling standpoint promise to get the MANLY in a class distinctly apart from the rank and file of competition.

—a line of trucks scientifically yet above all **practically** designed in conformity with the latest approved principles of commercial vehicle construction.

—a line of trucks which will be efficiently manufactured—consequently priced **right** and sold in accordance with a sales policy which will ensure dealers decidedly more than the conventional profit.

As our output for 1917 will be necessarily limited, immediate action is to be desired. Look over the 24 MANLY structural features—then write us for complete specifications, prices and interesting dealer's proposition—TODAY.

MANLY MOTOR CORPORATION
1436 Michigan Avenue Chicago, Illinois

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PALMER SERVICE PM DEPENDABILITY MOORE TRUCKS

WHAT WOULD YOU CHARGE FOR THESE TRUCKS?

This is an open question addressed to every truck dealer in the United States.

We want you to look at the photograph of the new PALMER-MOORE as illustrated here. We want you to read carefully the detailed specifications on the opposite page. Compare these specifications with those of other trucks of equal capacities.

Then—sit down and write us exactly what you, personally, consider a fair price to the consumer for each of the above models.

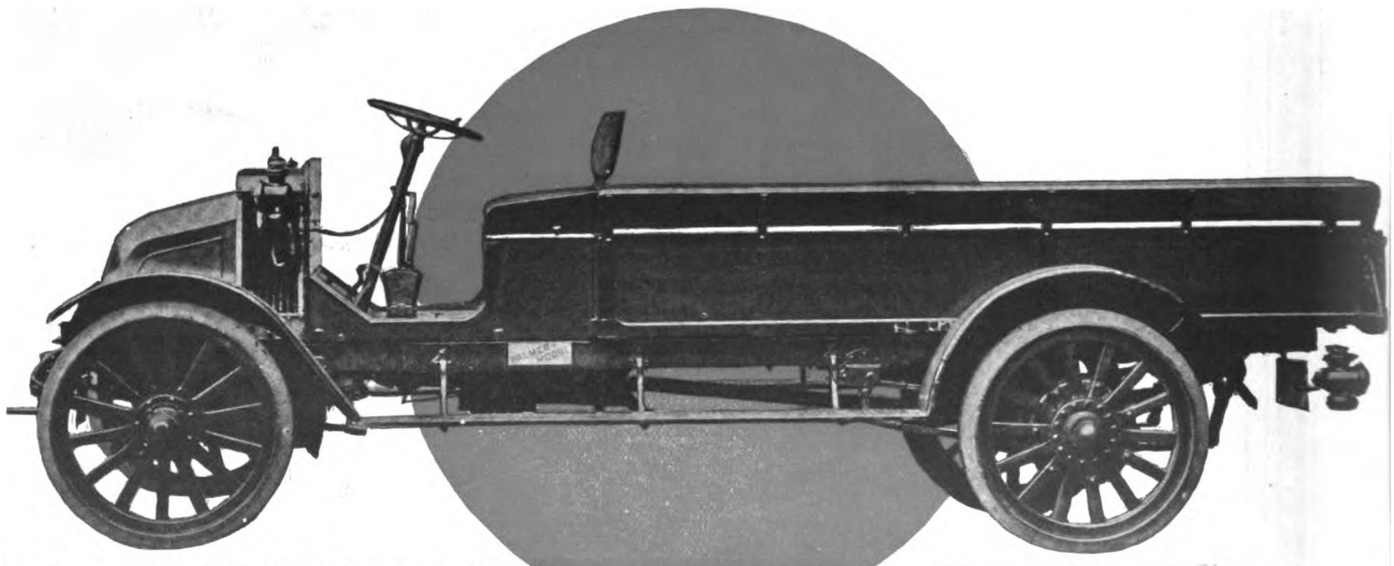
The price of our new 1917 one and two-ton models will be based absolutely on what the consensus of dealer opinion throughout the country determines to be a fair price for them.

The announcement of this price will be made January 1st, 1917. Territory will be allotted to dealers after that date. The wise dealer will get in his application for territory NOW!

Just a word in regard to the PALMER-MOORE policy. Our factories are in a position to make good on our delivery promises. In order to protect ourselves and you on this point, we will not allot any more territory than our production capacity will permit. Again, wisdom should dictate, "Apply for territory NOW!"

Realizing that there are times when the dealer must extend time to the consumer, we are prepared to co-operate with him on this point as well, rounding out our policy of protection and help to every PALMER-MOORE dealer.

WHAT WOULD YOU CHARGE FOR THESE TRUCKS?



PALMER-MOORE COMPANY

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1917 Announcement

MODEL M—1 TON CAPACITY

(Designed to Stand Excess Strain)

MOTOR—Buda. 3½" bore by 5⅛" stroke, 4 cylinder L Head cast enbloc. Enclosed valve mechanism. Valves interchangeable, stems hardened, 1½" working diameter, removable bushings. Three bearing crank shaft, balanced. Pistons, connecting rods and all reciprocating parts balanced. All moving parts easily accessible. Constant level oiling system, positive pump. Oil supply 7 quarts capacity. Thermo-syphon cooling. Main and connecting rod bearings, bronze shell, nickel babbit. Cam-shaft bearing phosphor bronze. High tension magneto with special automatic spark advance. Zenith carburetor. Automatic governor controlled by suction of gas. Three-point suspension.

RADIATOR—Dash-board type. Seamless helical tubes. Top and bottom sections cast, bolted to cooling sections. **Cooling sections interchangeable.** Spring mounted.

CONTROL—Left-hand steer. Center control gear shift and emergency levers. Foot pedals for clutch and service brakes. One lever only (for throttle) on steering wheel. Spark control automatic.

DRIVE—Straight line through four universal joints (two ahead of transmission) and 2¼" tubular shaft to internal gear rear axle.

GEAR RATIO—Direct on high, 7.1 to 1. Second 10.6 to 1. Low 18.9 to 1. Reverse 26.2 to 1.

ROAD SPEED—20 miles per hour at 1400 motor R.P.M.

CLUTCH—Borg & Beck. 10" multiple disc.

TRANSMISSION—Covert. Selective type. Three forward speeds, one reverse. All gears nickel steel, ⅞" face. Hyatt roller bearings.

FRONT AXLE—Sheldon. "I" beam section, spindles 1-37/64" by 1-3/8". Bower roller bearings.

REAR AXLE—A dead axle carries the load and takes all road shocks. The live axle and the internal gears, located in the rear wheels, transmit the power and have to stand transmission strains only. Bower roller bearings.

BRAKES—Service 15" x 2-1/2", external contracting on rear wheels. Emergency 14-5/8" x 2-1/4", internal expanding on rear wheels. Both have extra length equalizer bars.

FRAME—Parish and Bingham. 3/16" pressed steel, channel section, 38" wide and inswept to 33-1/2" between front wheels, 4-1/2" deep, 3" wide at offset, 180" long. Cross members and corners gussetted and hot riveted.

SPRINGS—Semi-elliptic. Front 38" by 2", 8 leaves. Rear 50" by 2", 8 leaves. Front hanger of rear spring designed to take driving thrust and prevent breakage of spring eye. Adjustable to relieve pressure and wear on spring bolt. Rear spring design includes a straight underslung spring, 3 leaves, to prevent rear end jumping up, also to act as auxiliary spring under excess loads. **Both front and rear springs designed with special non-slip feature.** All spring bolts have grease cups.

WHEELS—Artillery type. 14-1-3/4" square spokes, front and rear.

TIRES—Motor truck type. Front 34" by 3", rear 34" by 4".

STEERING GEAR—Ross, worm and nut type. 18" hand wheel.

WHEEL BASE—126". Tread 56".

CHASSIS WEIGHT—3150 pounds.

FUEL TANK—Pressed steel, 16 gallons capacity.

STANDARD BODIES—Open express, stake (both styles with or without driver's cab), express with full top, and full panel.

LOADING SPACE—Standard; 9 feet long by 46" wide back of driver's seat. Height of floor 34" from ground.

STANDARD COLORS—Chassis, red. Body, Richelieu blue.

EQUIPMENT—Running boards, front and rear mudguards with aprons. Side and storm curtains with all cab tops or top bodies. Oil side and tail lamps. Complete set of tools in kit. Horn.

MODEL O—2 TON CAPACITY

(Designed to Stand Excess Strain)

MOTOR—Buda. 4⅛" bore by 5½" stroke. 4 cylinder L Head cast enbloc. Enclosed valve mechanism. Valves interchangeable, stems hardened, 1⅞" working diameter, removable bushings. Three bearing crank shaft, balanced. Pistons, connecting rods and all reciprocating parts balanced. All moving parts easily accessible. Constant level oiling system, positive pump. Oil supply 8 quarts capacity. Pump cooling. Main and connecting rod bearings, bronze shell, nickel babbit. Cam-shaft bearings, phosphor bronze. High tension magneto with special automatic spark advance. Zenith carburetor. Automatic governor controlled by suction of gas. Three-point suspension.

RADIATOR—Dash-board type. Seamless helical tubes. Top and bottom sections cast, bolted to cooling sections. **Cooling sections interchangeable.** Spring mounted.

CONTROL—Left-hand steer. Center control gear shift and emergency levers. Foot pedals for clutch and service brakes. One lever only (for throttle) on steering wheel. Spark control automatic.

DRIVE—Straight line through four universal joints (two ahead of transmission) and 2½" tubular shaft to internal gear rear axle.

GEAR RATIO—Direct on high 8 to 1. Second 12.8 to 1. Low 26.4 to 1. Reverse 34.4 to 1.

ROAD SPEED—15 miles per hour at 1175 motor R.P.M.

CLUTCH—Borg & Beck. 12" multiple disc.

TRANSMISSION—Covert. Selective type. Three forward speeds, one reverse. All gears nickel steel, 1-1/4" face. Hyatt roller bearings.

FRONT AXLE—Sheldon. "I" beam section, spindles 1-31/32" by 1-3/4". Bower roller bearings. Steering knuckle has ball thrust bearing.

REAR AXLE—A dead axle carries the load and takes all road shocks. The live axle and the internal gears, located in the rear wheels, transmit the power and have to stand transmission strains only. Bower roller bearings.

BRAKES—Service 18" x 2-1/2", external contracting on rear wheels. Emergency 17-1/2" x 2-1/4", internal expanding on rear wheels. Both have extra length equalizer bars.

FRAME—Parish and Bingham. 7/32" pressed steel, channel section, 38" wide and inswept to 34-3/4" between front wheels. 5-9/16" deep by 3" wide at offset, 212" long. Cross members and corners gussetted and hot riveted.

SPRINGS—Semi-elliptic. Front 40" by 2-1/2", 9 leaves. Rear 50" x 2-1/2", 11 leaves. Front hanger of rear spring designed to take driving thrust and prevent breakage of spring eye. Adjustable to relieve pressure and wear on spring bolt. Rear spring design includes a straight underslung spring, 3 leaves, to prevent rear end jumping up, also to act as auxiliary spring under excess loads. **Both front and rear springs designed with special non-slip feature.** All spring bolts have grease cups.

WHEELS—Artillery type. 14-2" square spokes, front and rear.

TIRES—Motor truck type. Front 34" by 4", rear 34" by 6" single.

STEERING GEAR—Ross. Worm and nut type. 18" hand wheel.

WHEEL BASE—140" or 160". Tread 56".

CHASSIS WEIGHT—4300 pounds.

FUEL TANK—Pressed steel, 16 gallons capacity.

STANDARD BODIES—Open express, stake (both styles with or without driver's cab), express with full top, and full panel.

LOADING SPACE—Standard: 11 ft. long by 56" wide. Height of floor 37" from the ground.

STANDARD COLORS—Chassis, red. Body, Richelieu blue.

EQUIPMENT—Running boards, front mudguards with aprons. Side and storm curtains with all cab tops or top bodies. Oil side and tail lamps. Complete set of tools in kit. Horn.

PRICE—$1675.00 Chassis, painted, with front body.

110 N Geddes St. Syracuse, N. Y.

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STEGEMAN 6 (SIX CYLINDER) TRUCKS

5 Ton Stegeman Six Makes 5¾ Miles On Each Gallon of Gas

What the Cudahy Packing Co. Say

"WE are pleased with the performance of our 5-Ton Stegeman Six Cylinder. After being steadily in use for six months we are getting an average of 5¾ miles on each gallon of gasoline and 90 miles on a gallon of oil. We attribute this saving to the electric starter which eliminates the idling motor—and to the Six with its steadier pull. We deliver 20 tons a day over a route of 50 miles. We are perfectly satisfied in every respect."

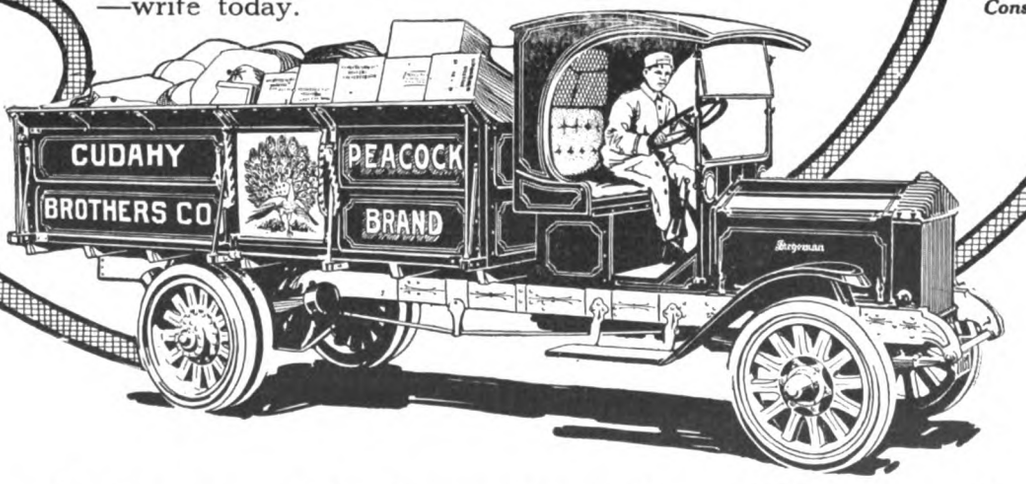
The Only Six-Cylinder Made

The Stegeman Six with electric starter and lights dominates the truck situation, eliminates competition, by showing greater mileage per gallon, more power, better cooling, **absence of vibration,** smoother operation and the lowest price top notch truck on the market. Get our agency selling plan at once and eliminate competition —write today.

Sizes:

1½ TON
2½ TON
3½ TON
5-TON
7-TON

Send for our Catalogue and Circular on Axle Construction



Stegeman Motor Car Co. Milwaukee

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WIRE—

Get This Great Truck-Selling Plan for 1917

ACME THE TRUCK OF PROVED UNITS

Realize the LARGEST RETURNS on your agency interest—operate at MINIMUM EXPENSE. Our plan places this strongly-financed company RIGHT BEHIND YOU—with profit-making methods, advertising and sales campaigns that WIN!

America's greatest truck features are embodied in ACME One-Ton and Two-Ton Worm Drive Trucks, and our cars are oversize in general dimensions, as well as highly economical in use of gas, oil and tires. No greater evidence of quality and reliability IS POSSIBLE.

Take the ACME Two-Ton Worm Drive Truck: It has 40 H.P. Motor—148-inch wheelbase—full floating rear axle, easy clutch, 16-inch brakes, chassis 217½ inches over all.

The "balance" of every ACME Truck is perfect. The spring suspension and the method of transmitting the driving thrust from the rear axle to the extra-strong frame has been so carefully worked out that there is a lack of harshness. ACME construction has great elasticity, assimilates punishment without severe shaking up and dangerous strain. The ACME has unusual DURABILITY.

Continental Motor
Timken Worm Drive
Timken Front Axle
Timken Rear Axle
Timken Bearings
Warner Clutch
Warner Transmission
Detroit Springs
Long Radiator
Eisemann Magneto
Rayfield Carburetor
Gemmer Steering Gear
Smith Pressed Steel Frame
Pierce Governor
Stewart Vacuum System

Deliveries On The Dot!

NO LAPSES. Our production is PLANNED AHEAD when we make our arrangement with you. You get trucks when you want them.

Get the Facts! Get the Figures!

—of our 1917 truck-selling plan. Block your competitor by wiring NOW. Learn about the greatest merchandising plan the industry offers you on selling trucks.

Cadillac Auto Truck Co.
111 Mitchell Street
Cadillac, Michigan

HAND THIS TO THE MESSENGER

TELEGRAM

Cadillac Auto Truck Company,
111 Mitchell Street, Cadillac, Mich.

Reserve territory. Send 1917 Agency offer.

Name .....

Address .....

Now Selling .....



ACME
One Ton Worm Drive, Chassis Equipped, $1500.

ACME
Two Ton Worm Drive, Chassis Equipped, $2100.

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SANDOW







Always Fill One Of The 5

Buying motor trucks is like buying shoes. If they fit, you're in clover. If they don't, you might as well throw them away. They'll do you more harm than good.

That's the reason for the five models of the famous SANDOW TRUCK. One of those models—1, 1½, 2, 3½ or 5-ton capacity—will fit your business. A SANDOW salesman, after thorough investigation of your requirements, will tell you which it is.

Wherever the SANDOW has been used, it has made good—and it will continue to make good. Under all conditions of service, in every kind of business, it has proved its ability to operate efficiently and economically.

The SANDOW Truck, every model, is made up of standardized parts—parts you know from experience are making good on leaders everywhere—properly assembled to make the most of every unit built into the whole.

And in addition there is a list of *exclusive* SANDOW *features* that have gone a long way toward making possible the fifth addition to our factory—just completed—in only four years.

Ask a SANDOW dealer to investigate your needs before you buy a motor truck. Let him fit your business with a truck that makes good in profits.

Write for Illustrated Catalog and Details

SANDOW MOT

Factory: No. 1—3300-3350 GRAND AVE., CHICAG

GENERAL SALES OFFIC

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TRUCKS

The Bill Models Is Yours



Dealers: What do you say to customers who want 5-ton trucks, when the line you represent stops at 4000 lbs.?

Do you say: "My competitor around the corner handles 5-ton trucks," or do you get them once on a misfit sale, and think you've made a profit?

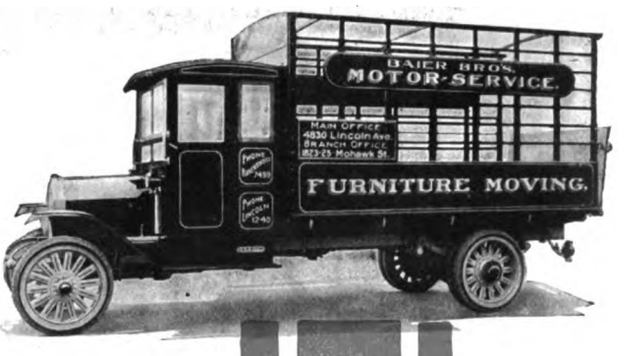
SANDOW truck dealers don't have any problems like that to solve. Whatever their customers need they can deliver. Five models—from 1 to 5-ton capacity—fit every requirement, satisfy every prospect.

The SANDOW is not a new motor truck. For 4 years it has been giving continuous, satisfactory service to owners throughout the country. Five times in those 4 years we have enlarged our factory to accommodate the business our dealers have turned in. The latest addition is just now completed, and the SANDOW MOTOR TRUCK CO. is better than ever able to serve its dealers and users.

When you select your agency for the coming winter, and next summer as well, consider the foundation of the company you are to be associated with. Consider its financial backing, its factory, its personnel.

You will find no company better able than the SANDOW to take care of you on deliveries, variety of models, and service. None is more highly accredited financially. None can serve you and your patrons more cheerfully.

Investigate the SANDOW Truck—the truck of tremendous re-orders, of standardized parts, and satisfactory service wherever in operation. Backed by our unqualified guarantee. An opportunity for dealers that can't be beat.



Write for Liberal Dealer Offer and Details of Selling Plan

OR TRUCK CO.

Factory: No. 2—2916-2924 West Lake St., Chicago
1714 MICHIGAN AVE., CHICAGO

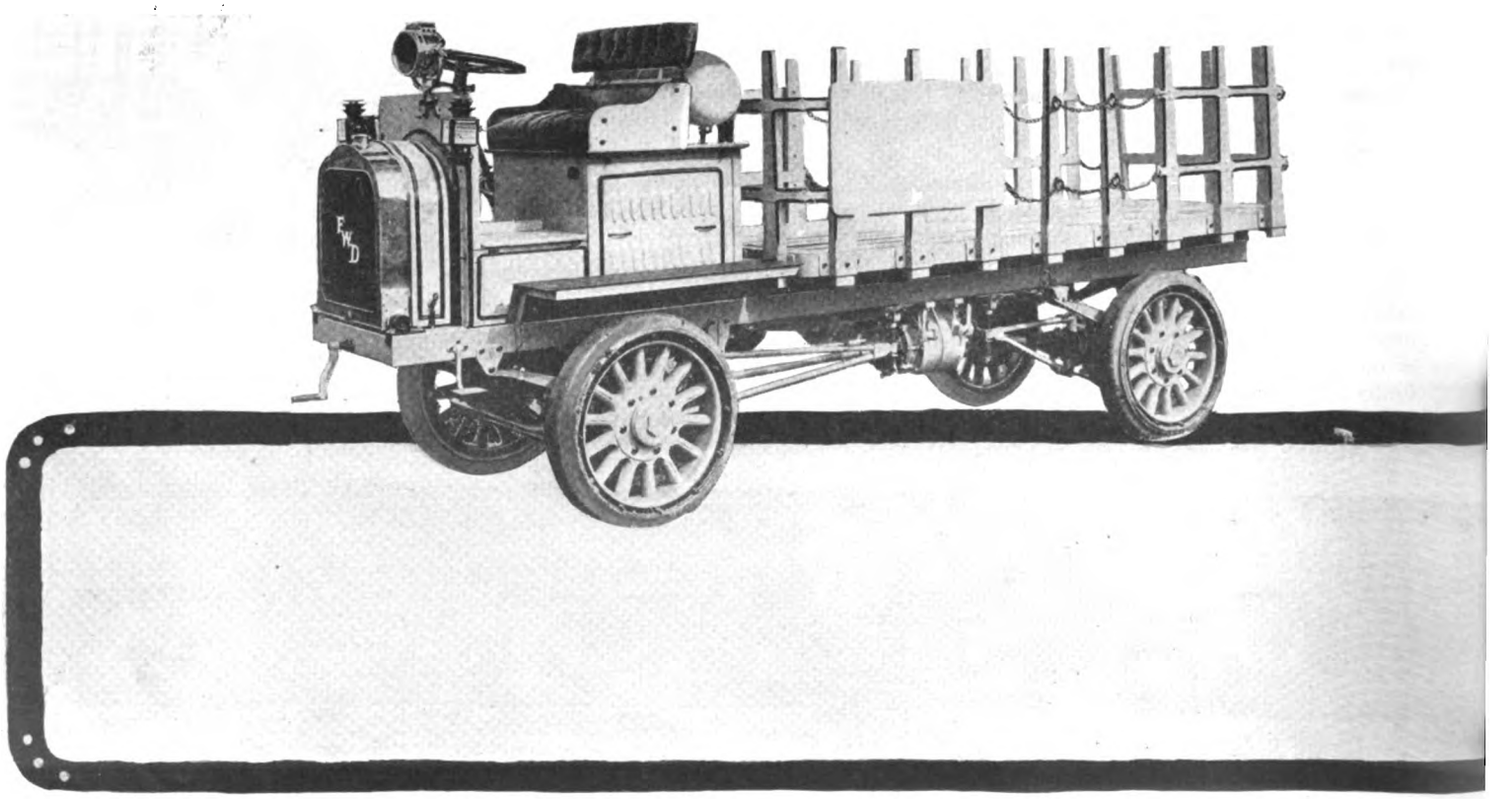
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F W D

Power
Traction
Strain
Load
Vibration
Tire Service

THE principle of the four wheel drive, or power in all wheels, as applied in the F. W. D. Truck, adds greatly to the Dependability and Economy of Motor Truck Service.

With power in both front and rear axles, the loads and strains are divided and equalized, thus doing away with some of the greatest causes of wear and breakage—***unequal strains and vibrations.*** Tire saving is an exclusive advantage of the F. W. D. Equal distribution and the F. W. D. standard 56-inch tread—rear wheels tracking with the front—make an actual tire saving as high as $250 in a year—$1250 in five years of service.



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Equally Distributed Throughout the Chassis

F. W. D. TRUCKS

are built for business men who want a truck that will be a good investment—a truck that is dependable in service—that is economical in upkeep—that will pay dividends in extra life and extra efficiency.

This sort of business man also investigates the stability of the manufacturer so that he can be assured of service during all the years that his truck will be in use.

The Four Wheel Drive Auto Company is the oldest exclusive manufacturer of four wheel drive trucks in the world.

The stability of this company is security to the buyer.

Write for descriptive catalog explaining the reasons in non-technical language why F. W. D. Trucks are Dependable and Economical.

The Four Wheel Drive Auto Company
Dept. K.
CLINTONVILLE, WISCONSIN.

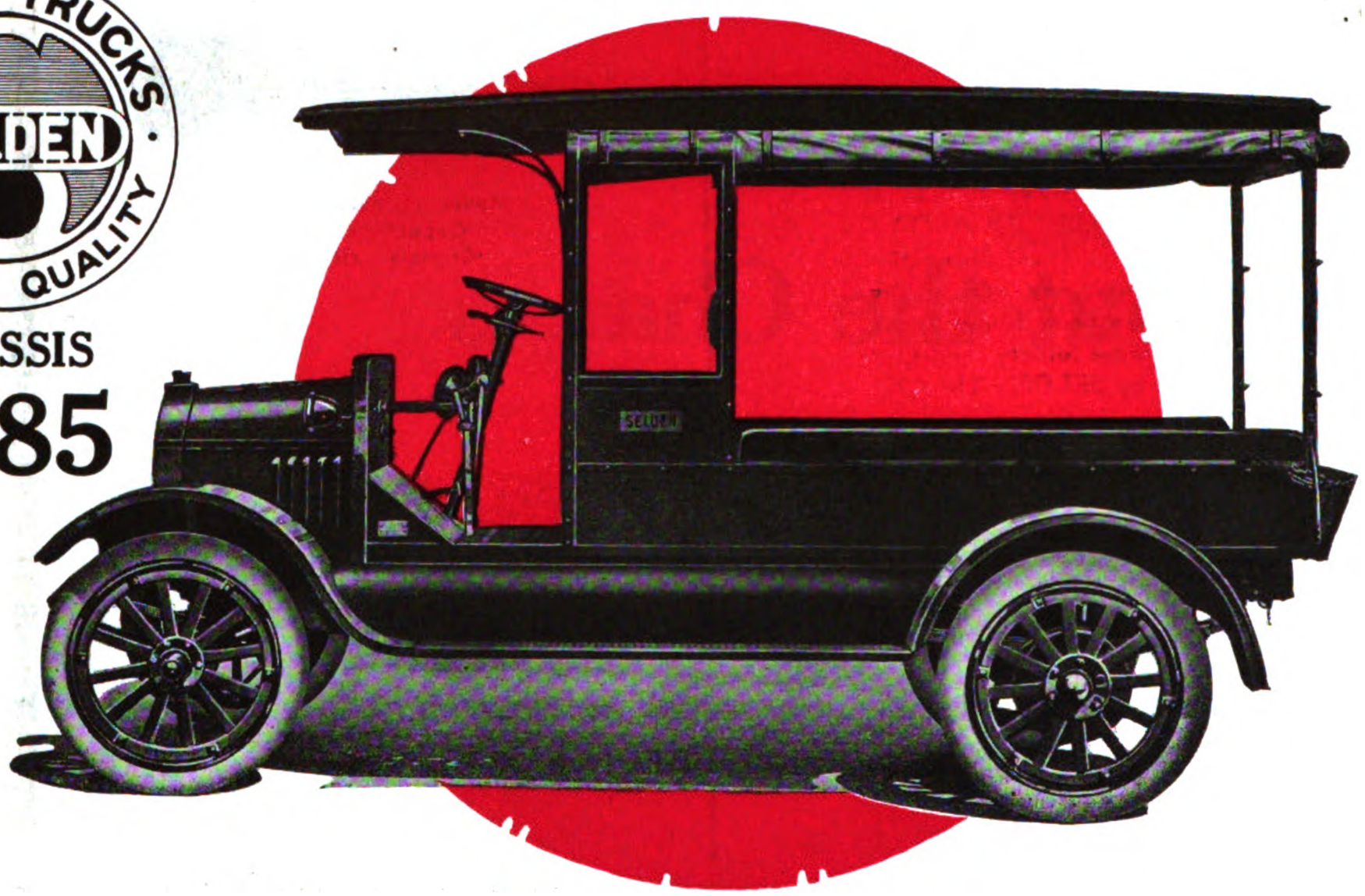
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WORM DRIVE

SELDEN TRUCKS · SELDEN · IN-BUILT QUALITY

CHASSIS
$985

f.o.b.
Rochester,
N. Y.



SELDEN (Worm Drive) DELIVERY CAR

INTRODUCING a new member of the Selden "in-built quality" family—Model G—designated as the SELDEN LIGHT DELIVERY CAR—A WORM DRIVE TRUCK designed and built especially for commercial purposes.

After two years of experimenting we have at last perfected a real motor truck of the LIGHT DELIVERY TYPE—worthy of the Selden name plate.

Here is a truck—**maximum capacity 1500 pounds**—that will enable you, as a dealer, to go after the better grade of prospects in your territory—a truck that you, too, can back to the limit and besides be a source of profit to you by reason of the fact that your profits will not go into "free service"—it's a truck that once sold will stay sold.

Dealers who have heretofore said that if they could "tie up" with a truck concern who knew the true definition of "DEALERS' CO-OPERATION" they would be interested—

Well—here's your opportunity—here's a truck company that is full grown, completely equipped, entirely dependable and who by reason of the fact that each and every member of the Selden organization from the President down have at some time in their life been on your side of the fence and can and do appreciate the needs of the man who every day must meet "face to face" the other fellow who bought because you said: "Bill, I'll personally guarantee this job." Let us place you in position to back up your statements—at a profit to you.

THE ACME OF MOTOR TRUCK CONSTRUCTION

UNIT POWER PLANT
4 cyl. truck motor, 3⅛ x 4½; multiple disc clutch, 3 speed selective sliding gear transmission.

FRAME
Pressed steel, 4" x 2" x 3/16".

WHEEL BASE
110 inches; turns in a 25 ft. space; body length 6 ft. 6 in. back of driver's seat.

WORM DRIVE AXLE
David Brown type of semi-floating construction.

FRONT AXLE
I beam section, 1⅝ x 2 3/16.

DRIVE
A real Hotchkiss drive

CHASSIS WEIGHT
1900 pounds with proper weight distribution.

STARTING SYSTEM
Can be equipped with electric starter and generator.

PNEUMATIC TIRES
Demountable type, extra rim.

SELDEN TRUCK SALES CO. Rochester, N. Y.

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Sell 'Em Selden

You can well afford to "Sell 'em Selden" because your profits will not be whittled away by the "free" use of your service station. We have thought this thing out and long ago arrived at the decision that the most profitable way—as well as the fairest and most satisfactory way—to run a truck business is to build "IN-BUILT QUALITY" into the truck at the factory. True, this "IN-BUILT QUALITY" idea of ours may add to the original cost, but it has always been found to be the cheapest in the end because of the constant and reliable service rendered by SELDEN TRUCKS everywhere. To prove this ask the next driver of a SELDEN TRUCK you meet and if he don't tell you that it's a 100% job, we miss our guess —try it.

We Mean It

Now, we mean and thoroughly believe every single word in this announcement and we are endeavoring to impress upon your mind our sincerity. The success of our business means the gathering about us of live, hustling dependable dealers. By reason of our increased manufacturing facilities coupled with a new truck selling policy we are in position to add to our dealers' organization a number of the right sort of men. If we are not represented in your territory and you can measure up to our requirements, WE WANT YOU. Ask us to send you a dealer's territorial application blank. This will save time and enable us to give your application intelligent consideration. Use the TELEPHONE, the TELEGRAM, or the MAIL—place the burden of our proving the SELDEN PROPOSITION the best for dealer or consumer on us. In other words, make us prove our claims.

Deferred Payments

The Selden Company "blazed the trail" on the deferred payment plan of motor truck selling—in fact, we were the pioneers in this phase of the business. Many have followed but few have excelled. The SELDEN WAY enables the dealer to get the business, as well as his profits, at the time the sale is made. This sort of sales help alone must appeal to you as a dealer. Details on request.

Selden Truck Sales Co.
Rochester, N. Y.

OTHER SELDEN MODELS



Model NL (Worm Drive)
Capacity 3½ tons
Chassis Price $2950



Model JWL (Worm Drive)
Capacity two tons
Chassis Price $2250



Model JC (Internal Gear Drive)
Capacity two tons
Chassis Price $2000



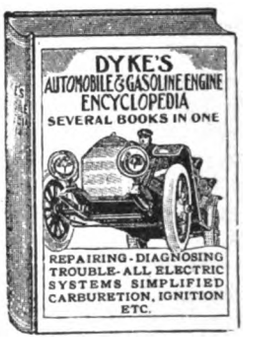
Model TL (Worm Drive)
Capacity one ton
Chassis Price $1700

SELDEN TRUCKS · SELDEN · IN-BUILT QUALITY

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Mechanical Instruction Books
For the Dealer

DYKE'S AUTOMOBILE and GASOLINE ENGINE ENCYCLOPEDIA



5TH EDITION—JUST OUT

A teacher, guide and reference on everything pertaining to motoring—simple as the A-B-C's.

It's worth ten times its cost, if only placed on the shelf and used as a reference.

2370 Illustrations. 824 Pages. 50 Instructions.

Price, $3.00. (Add 25c. to prepay.)

Free—with encyclopedia—a supplement treating on the FORD, PACKARD & KING—part printed in two colors.

AUTOMOBILE REPAIRING MADE EASY



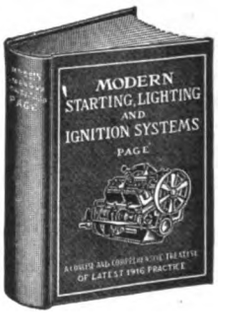
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A Comprehensive, Practical Exposition of Every Phase of Modern Automobile Repairing Practice.

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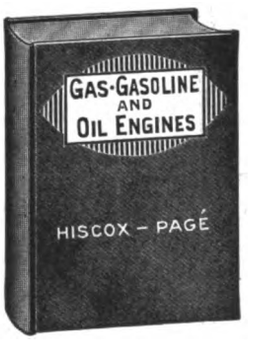


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Enlarged and brought up to date

By Gardner D. Hiscox, M.E.

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Enlarged and Entirely New Edition of this Standard Work, Considers exhaustively all Types of Stationary, Marine, Motor Vehicles and Aerial Power Plants. 640 PAGES, With Folding Plates—435 ILLUSTRATIONS. Price, $2.50 Net.

THE MODEL T FORD CAR



Its Construction, Operation and Repair

By Victor W. Pagé.

300 (5 x 7) pages. Over 100 specially made engravings and two large folding plates.

Price, $1.00

This book is written for FORD DRIVERS and OWNERS, by a recognized automobile engineering authority and an expert on the FORD, who has driven and repaired Ford Cars for a number of years. He writes for the average man in a practical way from actual knowledge. All parts of the Ford Model T Car are described. ALL REPAIR PROCESSES ILLUSTRATED AND FULLY EXPLAINED.

Book Department THE COMMERCIAL VEHICLE 241 W. 39th St., N. Y. C.

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Handle Your Time Sales On The Guaranty Plan



It is the only Time-Payment Plan which costs the dealer absolutely nothing

Since the first announcement just a few weeks ago that the Guaranty Time-Payment Plan is now available for truck and delivery car sales, a very large number of distributors and their dealers—and leading manufacturers, too—have already signified their intention to conduct their time sales on this plan.

The one big reason why the Guaranty Plan has been so successful from the start is that it is the only plan which provides a standardized system of handling time-payment sales, the only plan whereby these may be financed by the dealer with no brokerage or interest charges of any kind to be paid by him.

Get the facts of this plan and get them now. If you are paying one single dollar for financing your Time-Payment sales, you are paying just that much **more** than you ought to pay. Mail this coupon to us to-day and a personal letter in reply will immediately bring the details to you.

Truck dealers requiring help in "lifting" trucks or who need financial help in stocking them should use the Guaranty Acceptance Plan—the cheapest and most convenient form of banking assistance.

GUARANTY SECURITIES CORPORATION

Organized under N. Y. State Banking Laws

Equitable Building **New York**

Hobart Building **National Trust Building**
San Francisco **Montreal**

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Send us the facts of the Guaranty Plan about Trucks on Time Payments (or Guaranty Acceptance Plan).
We sell the.....
(Here state name of truck you represent)
Name .....
Address .....
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8 In 1

AMERICAN Convertible Motor Truck Body

Costs no more, weighs no more—with its exclusive combination of 8 *totally different bodies*—than any one of those bodies on an ordinary, well-built, single-form truck.

Convertible from any of the 8 types to any of the remaining 7, *in one minute*.

One motor truck AMERICAN equipped—

Takes the Place of A Fleet of Trucks

The 8 in 1 AMERICAN Convertible Motor Truck Body puts money in the pockets of owners with more than one use for their trucks. Saves additional expense of extra chassis, bodies, drivers, storage space and fuel. Eliminates the wasteful practice of allowing one or more trucks, involving heavy investment, to stand idle part of the time.

In your business, where one motor truck might operate at a loss, under ordinary conditions, **the same truck** equipped with an 8 in 1 AMERICAN Convertible Body should pay for itself and make consistent profits for you from the first. Serves in the place of a fleet of 8 cars, at the cost of one.

The 8 in 1 AMERICAN Convertible Motor Truck Body **fits on any chassis.** Attached without machine work, and removed if desired as easily as it goes on. As firm and secure on the chassis as the strongest one-purpose body.

Ask your dealer to demonstrate the AMERICAN 8 in 1 Body. It opens up a chance for big savings and additional profits for you. Or **write us direct** for free illustrated literature and details.

Dealers—A big new field just opening. Rich with prospects and big business. **Write or wire** for details. Some good territory still open. **Immediate action essential.**



THE AMERICAN WAGON COMPANY

Dixon Illinois

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STANDARD Equipment on 41% of models listed

The Accepted STANDARD of 1917 Truck Manufacturers

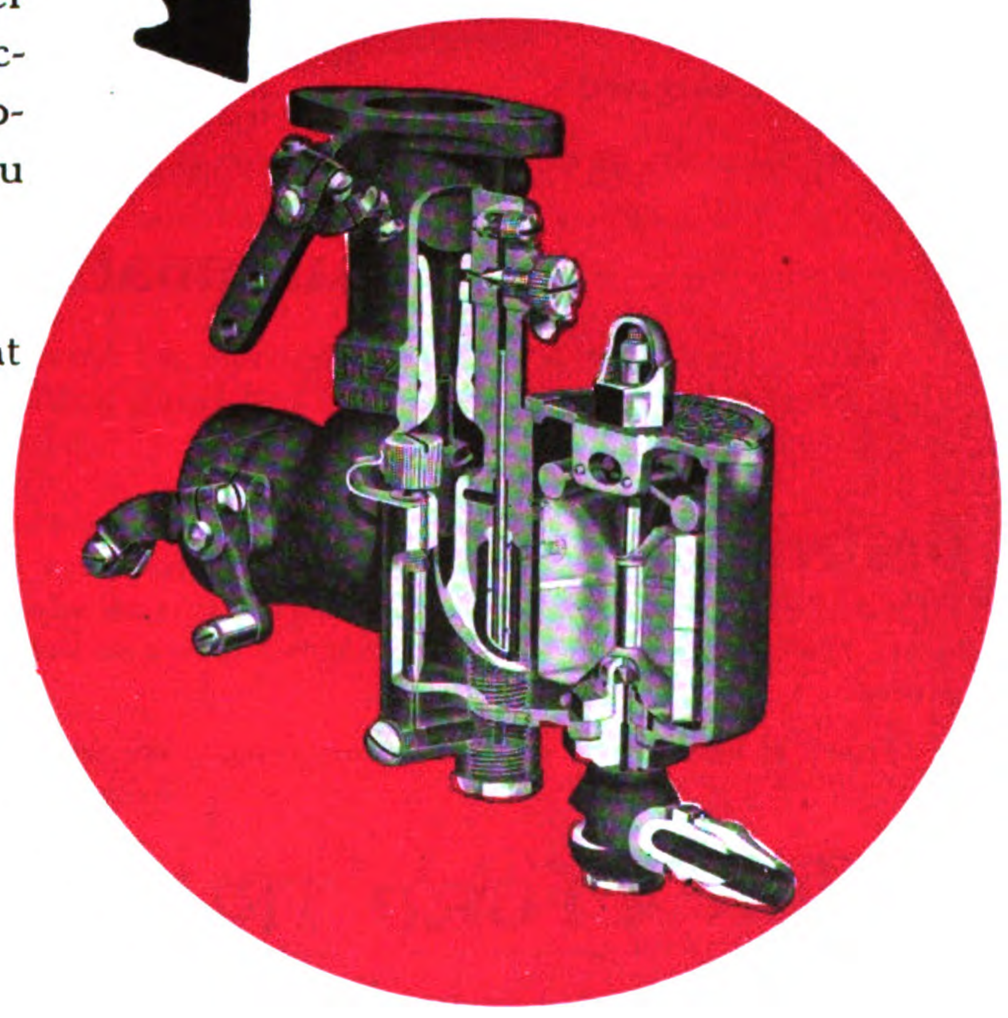
They have wanted a carburetor that was superior in every respect—one which would cause the least trouble and still develop the most satisfactory results in power and economy.

THE NEW STROMBERG CARBURETOR especially designed for Motor Trucks

In developing this carburetor, it has been our idea to deliver to the user an instrument efficient in operation, extremely easy to adjust, and one which will overcome the difficulties of starting in cold weather.

Figures talk—go over the list found on the other pages of this book—look over the class of manufacturers that specify "STROMBERG" as stock equipment. It surely is evidence sufficient to prove to you that this carburetor **is** the "Accepted Standard."

Write for proposition. Let us prove to you that all our claims are authentic.



STROMBERG MOTOR DEVICES COMPANY

Dept. 1135

64 East 25th Street, Chicago

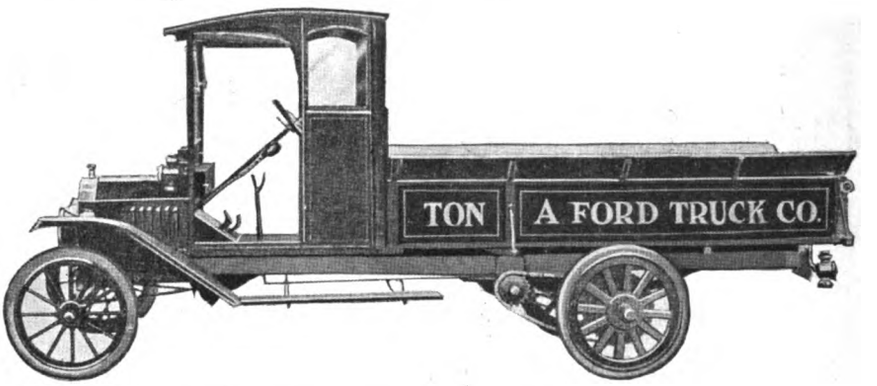
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A FORD EXTENSION CHASSIS THAT IS NOT AN EXPERIMENT

TON-A-FORD

(Trade Mark—Foreign Rights Reserved)

Makes Ford Cars Do Double Duty—Both as a Powerful One Ton Truck or Pleasure Car



The Only Practical Convertible Extension Chassis on the Market

$345.00 F. O. B. Racine

The TON-A-FORD converts a Ford Car into a One Ton Truck—which can be quickly converted back again into a pleasure car. No cutting of Ford axle, machining, nor removal of springs necessary. The original Ford Chassis is kept intact—merely remove touring or roadster body and rear wheels, then attach TON-A-FORD Extension, *our one-piece* sprockets, chains and quick-connecting devices.

All Difficulties of Earlier Models Overcome

Profiting by engineering mistakes, after exhaustive tests of parts and materials, and the results of road and load strains on earlier models put on the market, we offer the TON-A-FORD as the most practical Convertible Ford Extension Chassis.

TON-A-FORD I-Beam Axle Specially Designed



Guaranteed Not to Buckle—

Our specially designed I-beam axle is guaranteed not to buckle and will carry a 50% overload.

Automatic Oiling System

With every TON-A-FORD Extension, we furnish an *automatic oiling* system for the Ford Motor. This is a big advantage to the truck owner and being automatic relieves the driver of the worries and attention without such a system installed.

Dealers Here is a ***unique opportunity***—every Ford owner a prospect. Our large discount assures satisfactory profits. No other device of the kind has the practicability or the many selling features of the TON-A-FORD Extension Chassis. Every sale is an advertisement in itself—bringing in additional sales. The field is large, the demand is great—our contract offers an exceptional opportunity *to make money. Prompt deliveries guaranteed.*

There is still some good territory open. Write or wire us for *dealer's proposition* and complete specifications. Address Department C.V.

TON-A-FORD TRUCK CO., RACINE, WIS., U. S. A.

YOU CAN AFFORD A TON-A-FORD

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VESTA

Lights the Trails along the Border

700 U. S. A. Trucks Equipped with Vesta Lighting System

Down on the Mexican border 700 Kelley-Springfield, Pierce-Arrow, G. M. C. and Peerless army trucks are cruising over rough, desert trails day *and night*. Every one of these 700 trucks is equipped with the Vesta Generator Lighting System,—convincing evidence of Vesta superiority.

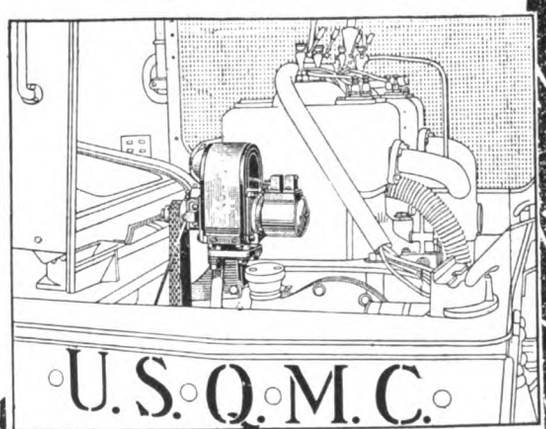
Under the hazardous conditions of service to which these army trucks are subjected, dependable, faithful lighting plays a vital part. Lighting must be certain. For this reason these manufacturers equipped their government trucks with the Vesta Truck Lighting System—the best known.

The Vesta Truck Lighting System is not an experiment—its worth has been thoroughly proved. It has been used with great satisfaction on trucks and pleasure cars for the past six years. Vesta is the truck lighting system used by the Standard Oil Co., Texas Oil Co., Armour & Co. and many other large fleet owners.

The Vesta first cost is not large—upkeep is practically nothing. A little distilled water in the battery and a drop or two of oil in the bearings occasionally are all the care necessary. And because of its simplicity and sturdiness the Vesta stands up perfectly, doing its duty year after year.

You should know more about the Vesta lighting system for trucks. Write for our booklet "Vesta Lighting System for Trucks."

Vesta Accumulator Co.
2100 Indiana Avenue CHICAGO, ILL.



The above illustration shows Vesta Generator Lighting System on Kelley-Springfield Truck

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A Profitable Service now being used in the

Factories which are producing 85 per cent. of the Motor Propelled Vehicles made in the United States.

Be sure you have it in your factory.

The service rendered by *The Iron Age*! Here are a few ways in which it can be profitable to you:

Its *Iron and Steel Markets* give each week absolutely reliable information, not only on prices, but on all the important activities which affect both prices and deliveries on all iron and steel products used in motor truck manufacturing. This assuredly can be a dollar-saving service in your Purchasing Department.

Its Buyer's Index will give you a practically complete reference to the manufacturers and producers of all materials of metal and supplies for your plant.

It will thus render your Purchasing Department a dual service. It will give you the information so you may know when to buy. It will tell you also where to buy.

Its many illustrated and technical articles will help your Production Department. Through *The Iron Age* you will get the best available information on developments in metallurgy, the production of new alloys, the heat treatment of steel, forging, foundry and machine shop practice, etc. In brief these articles will illustrate for your benefit methods and equipment used in other plants to produce work faster, cheaper or better than before. The Works Manager who adopts the suggestions in these articles will keep his plant running at top-notch efficiency.

Its *Machinery Markets and News of the Works* will offer your sales department many sales opportunities. Each week it brings a new list of prospects.

Eighty-five per cent. of the automobile and truck manufacturing capacity of the country is now represented in the subscription list of *The Iron Age*. Just what service it is rendering them may be surmised from the following list of the officials in one large company who are reading *The Iron Age:*

The Purchasing Agent	**Automobile Body Superintendent**
The Assistant Sales Manager	**General Stock Keeper**
Head of Engineering Department	**Charge of Skein, Spring Making**
Chemist	**Charge of Die Work, etc.**
Methods Engineer	**Charge of Machine Tool Making**

Price $5.00 a year in the U. S.

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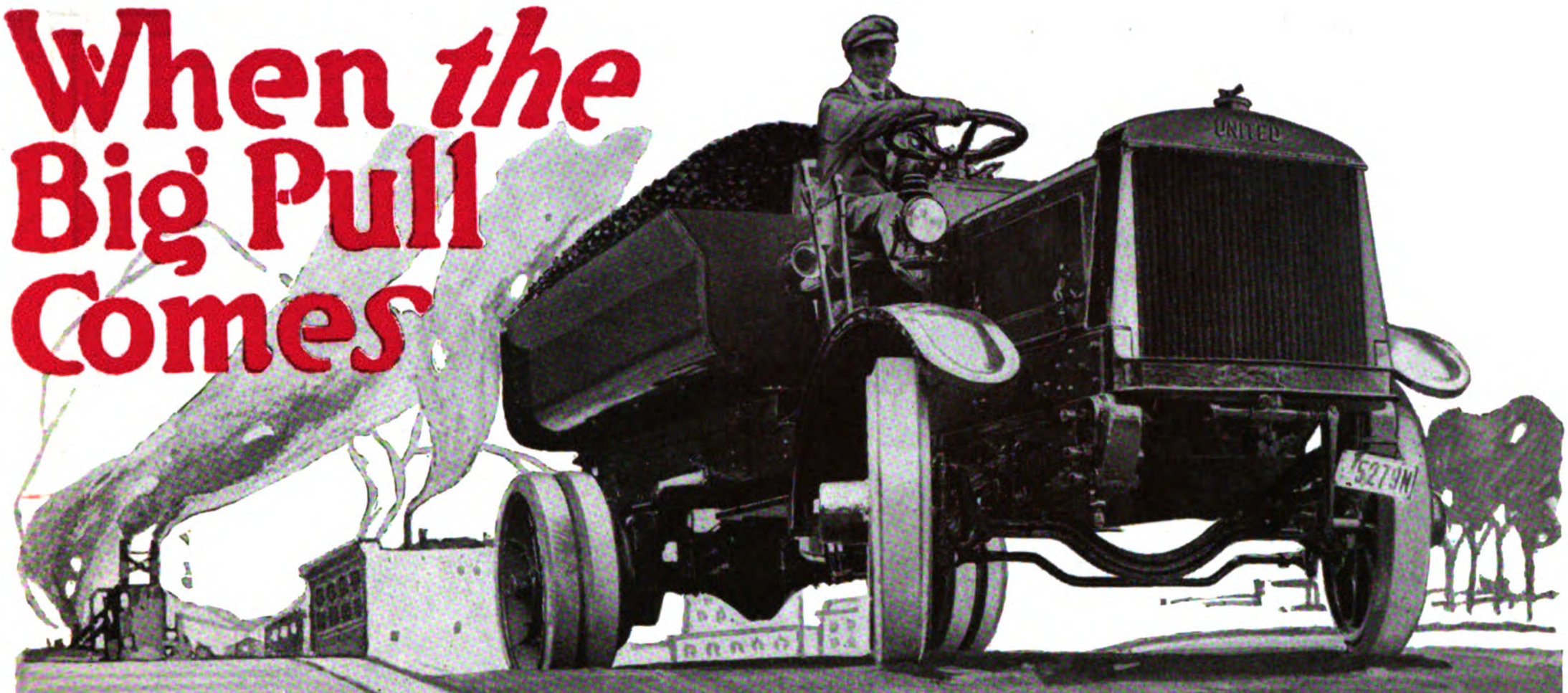
A weekly trade journal which can serve so many departments so throughly as can *The Iron Age* is certainly worth having. Its market reports are worth to you many times its cost for the year. Write for complimentary sample copy, or better still order it today for a year.

THE IRON AGE

239 West 39th Street, New York City

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When the Big Pull Comes





—UNITED TRUCKS top the crest with flying colors!

Ordinary trucks **may** be fairly efficient in ordinary service. It is when the big pull comes—when the unusual emergencies arise—that you will appreciate operating a truck that makes good on every claim which the manufacturer has for it.

United Trucks combine gigantic strength—scientific simplicity—ease of operation—economical upkeep.

Every detail of material and every mechanical unit entering into their construction is well known by name, reputation and practical experience.

They have tremendous power, and the biggest loads are transported in quick time. They have the strength and endurance to perform efficiently in the most severe service encountered, and they have the stability which insures a long life.

Truck dealers are today aware of the wonderful possibilities in the heavy duty field—they realize it is a field rich in prospects. As a consequence, the wide-awake dealers are coming to the United line of heavy duty trucks—the trucks that are easy to sell and **stay sold.**

United Trucks are made in 2, 3½, 4 and 5-ton sizes—all worm drive. If you are interested in connecting with a profitable line of this nature, get in touch with us at once.

UNITED MOTORS CO.

672 North Street GRAND RAPIDS, MICH.

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A Commercial Truckmobile

CARRYING CAPACITY—2,000 lbs.
FRAME—Length 166 inches, with 41½ inches, 4 inch channel, rolled steel.
AXLE—1½ x 2⅜ inches Drop forged "I" beam.
SPRINGS — Semi-elliptical, 2 inches wide, 44 inches long. 11 leaves. Massive bumper cross spring.
WHEELS — Heavy Artillery type, twelve 2 inch spokes, 32 x 3½ inches.
TIRES—Goodrich solid rubber, 32 x 3½ inches. Pressed on type, guaranteed 7,000 miles.
GEAR RATIO—7 to 1—26 teeth on jack shaft, 52 teeth on rear.

PRICE ONLY $325

DRIVE—Baldwin chains, heavy roller type, 1 inch pitch, ⅝" diameter of roller, ⅝" wide.
BRAKE—Emergency on rear wheels, expending type in drums operated by hand lever, 12 inch drum, 2½ inch shoe, Fiber lined.
LOADING SPACE—9 ft. or more back of seat.
WHEEL BASE—When attached to Ford chassis 133 inches.
TREAD — 56", center to center of wheels.
WEIGHT — Truckmobile attachment 1,000 lbs. Attached to Ford chassis complete, 2,000 lbs.

PLUS A FORD CHASSIS

The Commercial Truckmobile

Revolutionizes the Converted Ton-Truck Field

The **COMMERCIAL TRUCKMOBILE** at $325—a price far below that of the cheapest manufactured ton truck—together with the chassis of a Ford car, makes a 2000-lb. truck, dependable and inexpensive.

Thousands of business men, in need of modern methods of delivery and haulage, are users of the converted ton truck—a Ford chassis plus a heavy-duty unit.

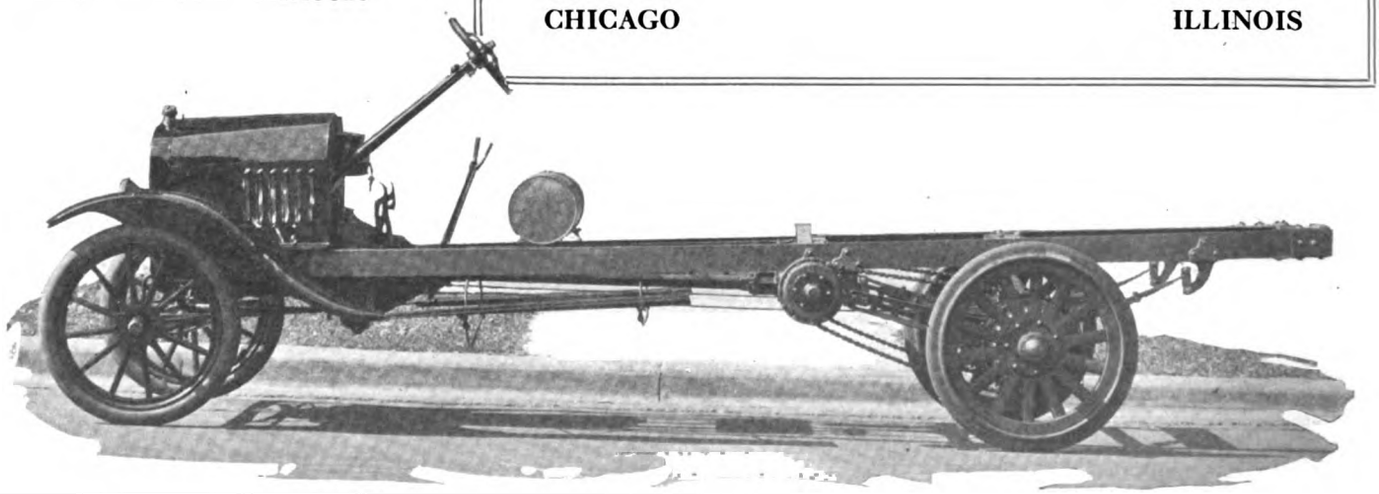
The **COMMERCIAL TRUCKMOBILE** is widely known for the added loading convenience afforded by its **extra width of frame,** thereby carrying the torque of the load directly over its massive side and bumper cross springs.

Don't slip through the winter, depending on unreliable vehicles to pull you out. **Write today** for complete **COMMERCIAL TRUCKMOBILE** details. Let us tell you how it will make more money than any other form of delivery or hauling, in your business.

Special Opportunity for Live Dealers. Write or Wire

Commercial Truckmobile Co.

CHICAGO **ILLINOIS**



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Wilson



Wilson Truck. Haulage Capacity Two to Four Tons. Four Cylinder Continental Motor. 40 Horsepower Sheldon Worm Drive Axle. Weight of Chassis 4500 Pounds. Price of Chassis, $2350.00.

The Wilson Motor Truck

By **STANLEY C. WILSON**



SOMEONE said a few days ago—"The big money in the future is going to be made selling trucks—not pleasure cars."

The first half of the statement is true.

The second half isn't.

Just as much money as ever will be made selling pleasure cars. But the competition will grow keener and keener as the years pass—and the net margins smaller.

The motor truck, on the other hand, is just beginning to come into its own.

The experimental period has been passed.

The motor truck has made good.

And now there opens up a field of really marvelous opportunity for the dealer in this type of power driven vehicles.

Heretofore it has been necessary for the dealer to sell not only a particular motor truck but the whole motor truck idea.

He has had to sell the economy of it—and the reliability of it—as well as the *desirability* of the particular truck he was handling.

Now—this introductory work has all been done.

Business men recognize the economy and the reliability of the motor truck. They know that sooner or later they must come to it. The dealer's job is simplified to the problem of *selling* the truck.

That being the case, the vitally important question for the dealer to decide is

What Truck To Sell

and that problem naturally divides itself into two heads—

The truck itself—

And the company back of the truck.

We want you to consider the Wilson Motor Truck from this viewpoint.

In the first place, the Wilson Truck is the outcome of practical experience and engineering work dating back to the infancy of the industry fifteen years ago.

The first Wilson commercial vehicles were produced in 1913, but no effort was made to market them.

In spite of the experience and engineering effort that were back of them, we determined to make them prove their thorough dependability before we placed the Wilson nameplate on them.

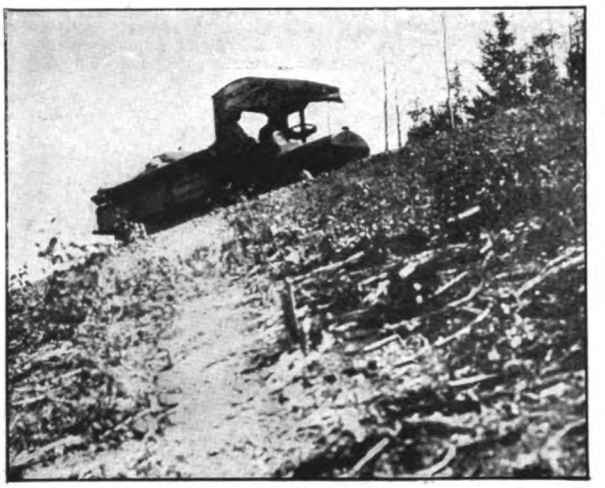
For two years they were tested in every conceivable way.

They were put into actual service in various lines of business.

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Wilson





The Wilson Two-Ton Truck carrying capacity load, on its famous record-making climb of Pike's Peak. The last 1,000 feet of elevation climbed over mule trail filled with rocks and ruts. No other truck has equaled this Wilson record.

One of them was sent to Denver and while there was driven, with capacity load, to the top of Pike's Peak.

It still holds the Pike's Peak record.

A year ago the Wilson Truck was first offered to the public.

We knew then that it would measure up to the Wilson standard of excellence.

The results of the past year have only strengthened our faith.

The Wilson Truck has fully demonstrated its quality, its stability, its economy.

It completely meets the requirements of that first problem—"What truck to sell."

The Company Back of It

The J. C. Wilson Company is a pioneer in the building of transportation vehicles.

It has ample factory facilities.

It is strongly financed.

It has Engineering and Production departments second to none in the industry.

And its long established relations with sources of supply have enabled it to fully protect itself against shortages of materials.

This makes it possible for the Company to do what practically no other truck builder in the country can do just now—

And that is to

Positively Guarantee Immediate Deliveries

The Wilson dealer can make his sale with every assurance that he isn't going to lose it on account of delayed delivery.

He can specify delivery dates—and the Company will make good.

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The opportunity is here—the market is ready—the truck is a proved and tried product.

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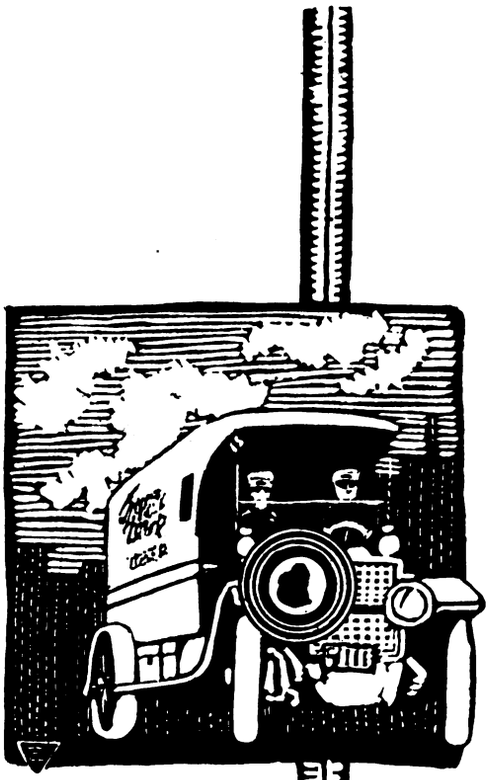
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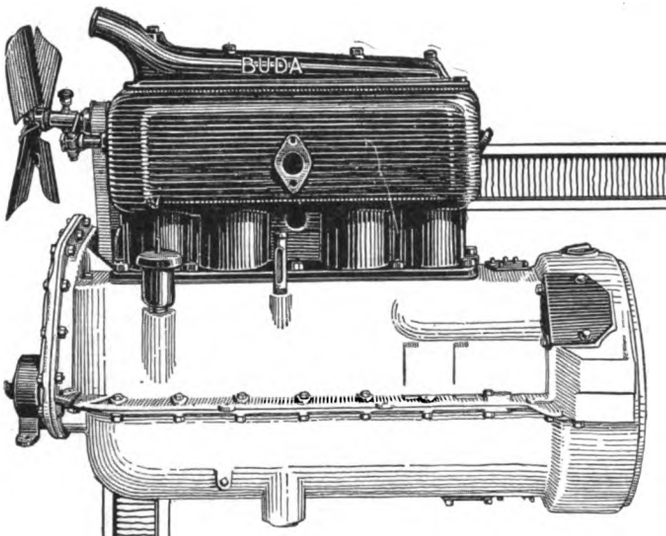
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that is why, eventually, the Berling will be standard equipment on ***most*** of the best trucks. On many good trucks it can be had now for the asking. Ask for the Berling on your next truck.

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Ericsson Manufacturing Company
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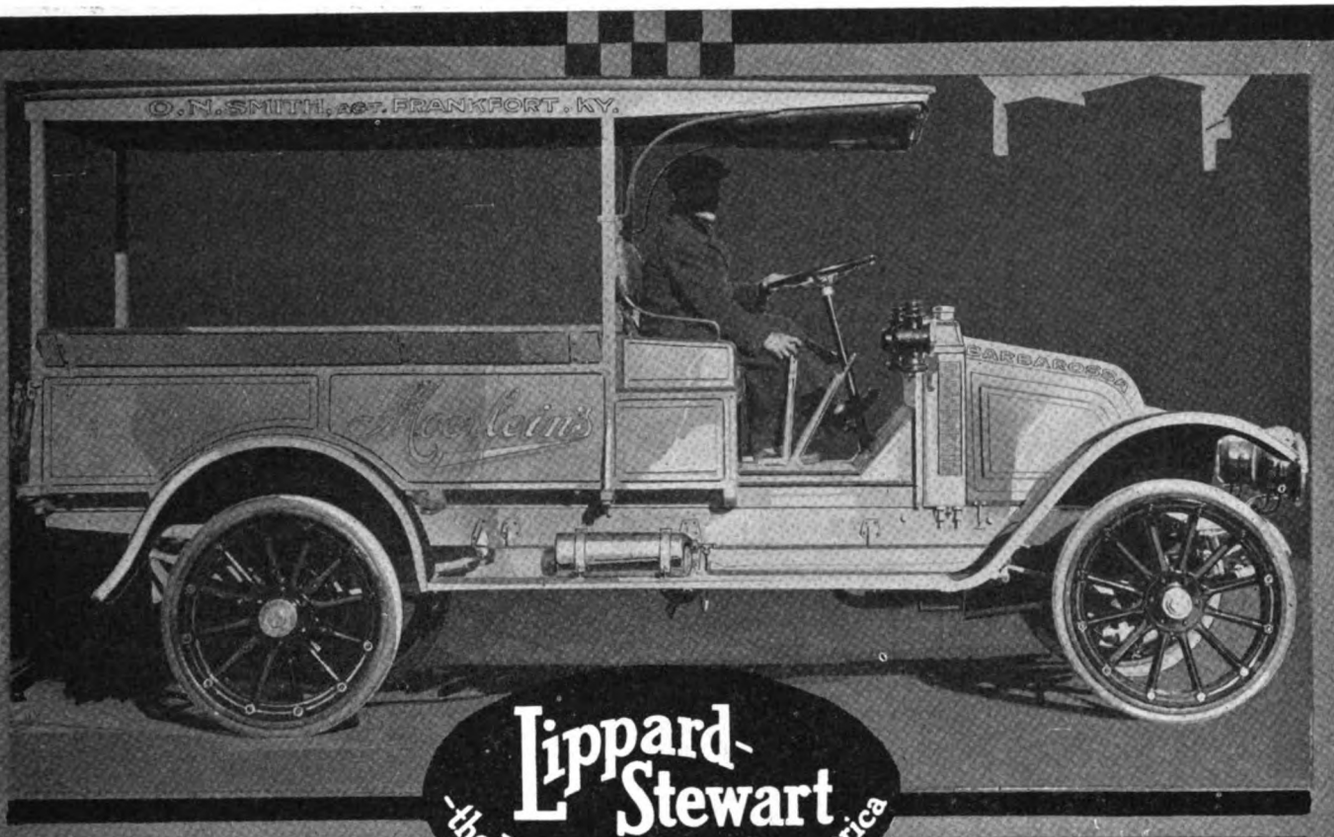
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BUDA MOTOR
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TRUCKS
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¶ Ninety-three truck manufacturers are using worm drive. More than half of 1916 trucks are worm driven. Nearly half of all 1916 models are worm driven.

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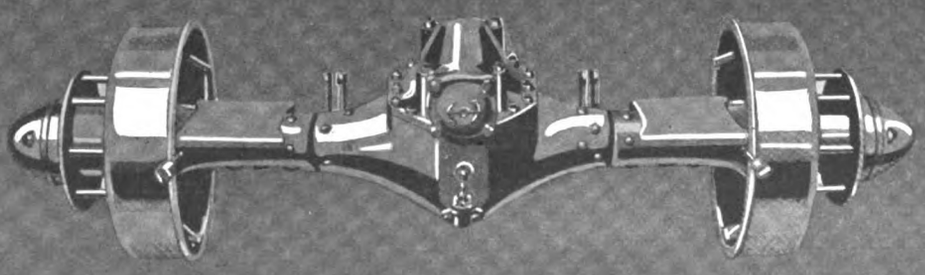
¶ There is nothing surprising in this situation, for from the standpoint of efficiency a worm gear type of drive represents the highest development yet recorded in truck manufacturing practice.

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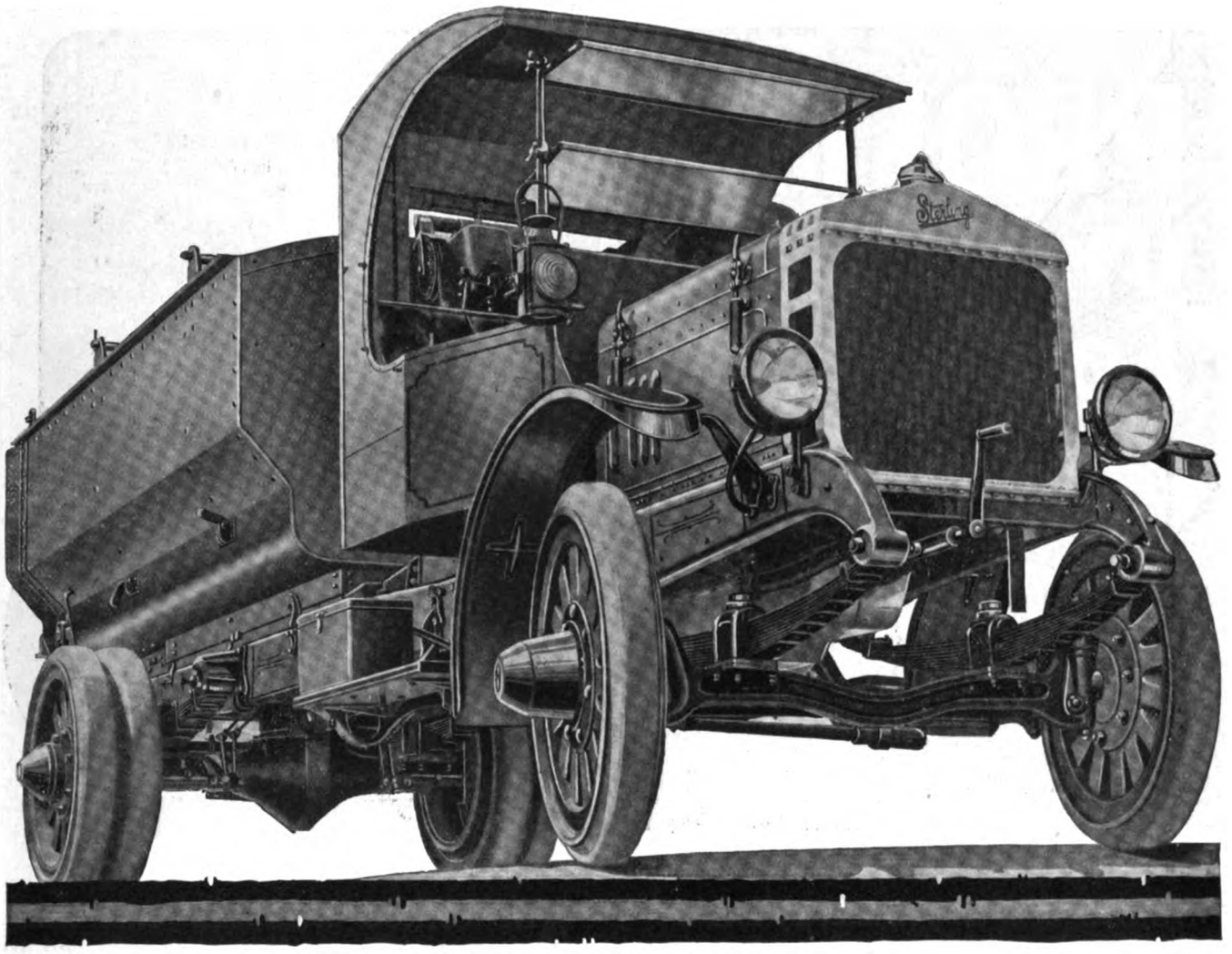
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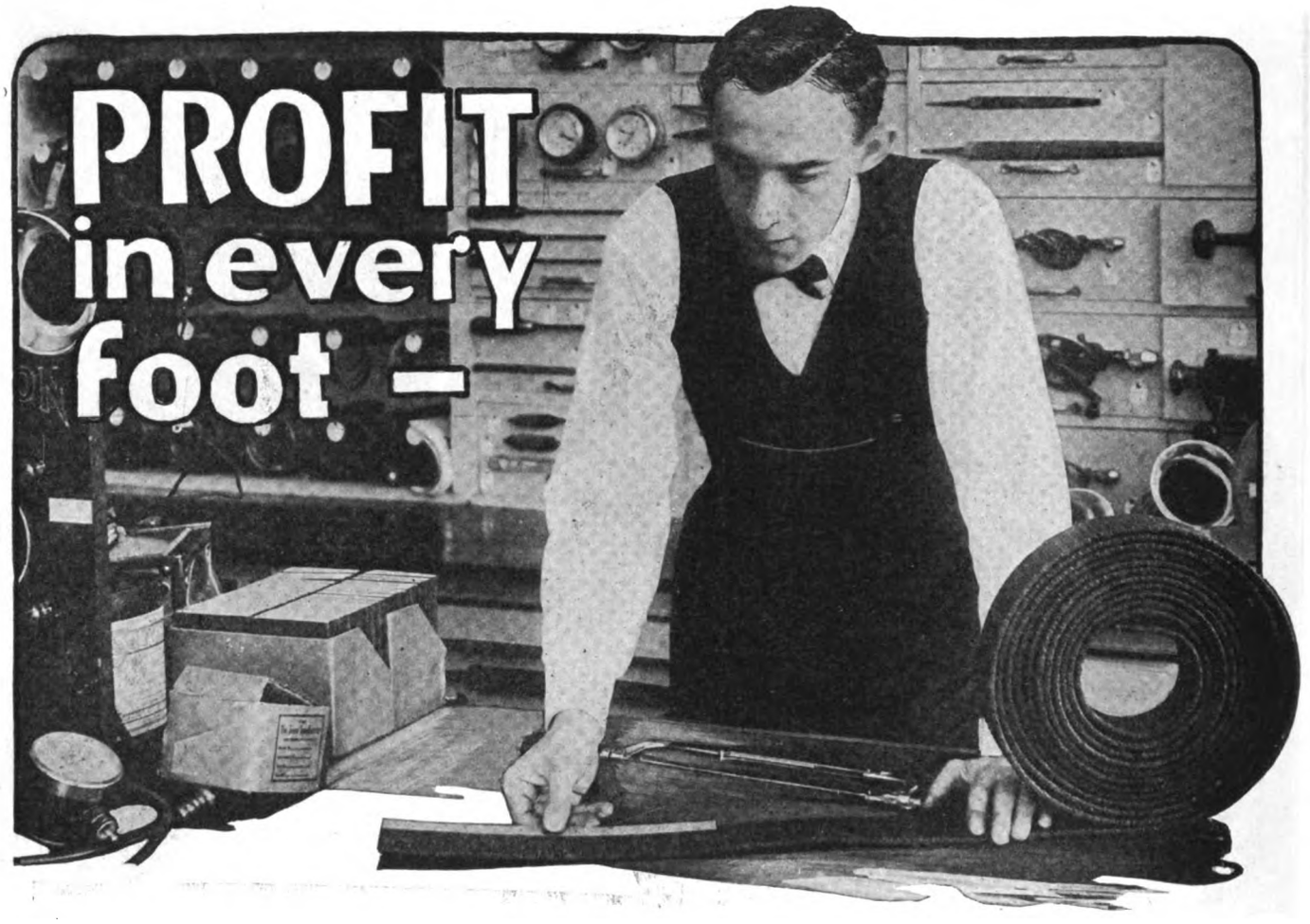
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GARCO is sold through all jobbers. Write us direct for full details of our plan to help you sell more Brake Lining and make a bigger profit on every foot.

The GARCO line of Asbestos Automobile specialties is complete. Write for prices on special type lining for Ford Transmission Bands.

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STRENGTH



THE HALL TRUCK

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Half the time, half the trouble, half the unkeep cost

The Hall Truck is built so strongly, so ruggedly, and with such a wide margin of safety that the ordinary calls of trucking are as nothing to it, while the extraordinary calls—the emergencies, where time,

Speed, Endurance and Big Ability

mean so very, very much in heavy duty work—bring out the best that is in the HALL.

It fairly eats up such opportunities to show what it can do, and always at a time when this kind of service means so much to its owner that he feels as though it were a real flesh and blood friend come to his rescue!

It is for these reasons that we find the Hayes Cartage Company, of Detroit, Michigan—a transportation company, dependent upon its trucks entirely for its very means of existence—owning seven HALLS and only two of other makes. This company has found that the HALL does more work in less time, and

Costs Less Money to Run Than Other Trucks!

And that they are there when needed with that extra strength, that extra endurance, that extra speed under big loads, that hill-climbing, corner-turning, mud- and sand-conquering ability, present only in machines built with an eye to emergencies beyond the usual, and fitted with extra power to meet them.

In addition to its own built-in speed, the HALL carries an improved Wood Hydraulic Hoist, which solves the loading and unloading problem. It is the quickest-working, simplest,

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DEALERS: Realizing that some of your customers may want to buy on the partial payment plan, we have arranged to finance such transactions for you.

Write for full particulars.

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Manufacturers of the Hall Truck

(*Established 1873*)

Ferry Ave. and Grand Trunk Ry. **DETROIT, MICH.**

FIVE MODELS: 2-ton, chain, $2,000; 3½-ton, chain or worm, $2,800; 5-ton, chain or worm, $3,400

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INTERMOTOR-NEW YORK

INTERNATIONAL MOTOR COMPANY

GENERAL OFFICES
WEST END AVENUE AND SIXTY-FOURTH STREET
NEW YORK

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October 6, 1916

Hess Bright Mfg. Co.
Philadelphia, Pa.

Gentlemen:-

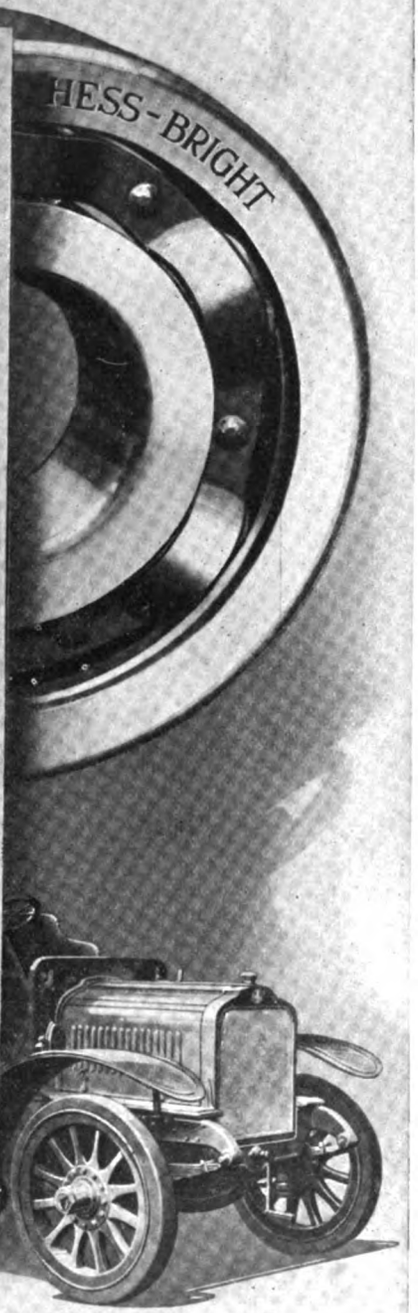
Referring to your inquiry as to what percentage of bearings you supplied us during the year 1915, we have checked the figures and find that we used approximately 65% of Hess Bright bearings in our trucks.

We thank you for the co-operation that your company has given us in solving our bearing troubles. You have made strong "boosters" of the mechanical men in our organization.

Yours very truly,

General Purchasing Agent.

WRE-W



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STRENGTH



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Half the time, half the trouble, half the unkeep cost

The Hall Truck is built so strongly, so ruggedly, and with such a wide margin of safety that the ordinary calls of trucking are as nothing to it, while the extraordinary calls—the emergencies, where time,

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FIVE MODELS: 2-ton, chain, $2,000; 3½-ton, chain or worm, $2,800; 5-ton, chain or worm, $3,600

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The COMMERCIAL VEHICLE
Read by Business Men

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The Commercial Vehicle
Read by Business Men
Vol. XV November 15, 1916 No. 8

Motor Trucking Centers of America

SYRACUSE, ROCHESTER, BUFFALO

Empire State's Great Industrial Region Important in Truck Manufacture and Use—Syracuse Distributing Center

SYRACUSE, N. Y., Oct. 2—As the distributing center for most of central New York, Syracuse has naturally become a truck center; but there are other reasons for the fact that 665 commercial vehicles are at present registered in Onondaga County, most of which are in the city itself. Syracuse offers physical advantages to trucks. She has very few grades, being located on a level plain; her pavements are good, and the wise old settlers who laid out her streets made them wide. There are a few diagonal streets, which serve to decrease running distances from outlying sections to the center of things, but not such a superabundance of them as to cause undue confusion of traffic as will be found in such cities as Detroit, Boston and New York City. Industrial Syracuse is not neighborly, but scatters itself far and wide over the city so that the trucking work becomes a work of long hauls.

Natural Trading Center

But for all of this, of course the position of Syracuse as a distributing center accounts for much of the success of the motor truck there. Syracuse has 150,000 population; Rochester, 250,000; yet Syracuse is the distributing center for central New York and Rochester is not. For one thing, Syracuse is centrally located, being about equidistant from Albany and from Buffalo, 150 miles from each, and about half-way between the shores of Lake Ontario and the northern line of Pennsylvania. The little city of Utica is more of a rival as a distributing center than the big city of Rochester. Besides, Rochester is so near Buffalo that it is overshadowed thereby.

Watertown, Oswego, Oneida, Fulton, Auburn, Ithaca, Cortland and Canastota are examples of the prosperous manufacturing cities whose citizens come to market in Syracuse. They are not dependent upon Syracuse for the everyday necessities but for their special requirements, such as machinery, vehicles and equipment, the more fashionable articles of apparel, and to a large extent as a wholesale distributing source of supply for all kinds of general merchandise.

In addition, it is an important produce and fruit distributing point. Jordan, a town of 3000, is the center of a rich truck-gardening section, catering to the Syracuse market. Onondaga Valley is noted for its fruit of all kinds, distributed through Syracuse. Celery and tobacco come from Baldwin, Phoenix and Fulton. Skaneateles, besides being the scene of "Tillie's Nightmare," sends much farm produce to Syracuse.

37 Industrial Suburbs

There are thirty-seven of these minor towns within a radius of from 15 to 18 miles, representing average hauls of around 12 miles each way. In them there are 130 trucks. Syracuse business houses daily send probably as many more out to them. Some of these towns are industrially prominent, such as Solvay, the home of the Solvay process of making borax and other alkalies, in which industry alone 5000 men are employed; Baldwinsville, whose Morris Machine Works Co. employs 1500 men in the manufacture of pumps; Fulton, the home of the American Woolen Mills, and Janesville, where 3000 toil in the quarries.

The interurban electric lines, which are numerous, bring in many shoppers from as far off as Cortland, 45 miles.

But Syracuse is not alone a distributing center. Her manufactures are im-

TRANSPORTATION is the life of industry and by its transportation may you know a city. With this idea in mind, herewith are presented the first of a series of studies of American cities and their manufacturing and business characteristics as affects the use and sale of commercial motor vehicles.

In every district there are certain centers of manufacture, others of distribution, still others of consumption. Most cities combine the characteristics of all three and obtain their character from the different proportions represented.

Each city has its peculiar physical peculiarities which assist or impede the handling of merchandise by various agencies. Its own geographical features, paving conditions, traffic problems and relation to water and rail transit.

Industrial and physical conditions largely govern the extent to which a city may become a motor truck center; but besides these, financial conditions and the progressiveness of its business also exert an influence.

In these and following articles on the subject a sincere effort has been made to discuss these subjects in a practical manner, in an impartial manner and as tersely as the subject permits.

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portant. Here the L. C. Smith typewriter and guns are made. The Syracuse Chilled Plow Works are here, together with branch plants of the J. I. Case Threshing Machine Co. and the John Deere Plow Works. Halcomb alloy motor-car steels, the Smith cast-steel truck wheel, Brown-Lipe, Brown-Lipe-Chapin and New Process gears, and Dyneto electric equipment for motor cars are all made here.

The H. H. Franklin Co., builder of the Franklin car, and three truck makers, Chase, Palmer-Moore and Sanford, are in Syracuse, besides a long list of other prominent industrials, such as the Continental Can Co., the National Can Co., Pierce, Butler & Pierce, stoves, radiators and boilers; Kraus-Heinze Co., electrical supplies; Syracuse Boiler Works, Merrell-Soule Co., maker of None-Such food products; Globe Malleable Iron & Steel Co., the Syracuse Twist Drill Co., six breweries, seven candle manufacturers, five big foundries, three paper mills and fifty cigar manufactories.

Light Vehicles Predominate

In spite of its great industrial development, it is a curious fact that most of the commercial vehicles in the city are of the delivery type, the very light converted passenger car and Ford adapter being in great evidence, showing that this is a great shopping center, with quick and long-distance delivery in demand.

Syracuse is not proud. She allows the railroad and canal to run through the center of her business district at grade, to the great impediment of traffic and the sacrifice of safety. It is not surprising to find, then, that one of the exclusive department stores has recently abandoned a very expensive fleet of high-priced passenger-car chassis used for delivery in favor of the cheapest thing obtainable.

Room for More Trucks

Syracuse is progressive, though, and is increasing the use of trucks in the retail delivery field. There is a great market among the industrial enterprises in Syracuse which has only just been broached. The new barge canal will soon be opened. It is located at a distance from the city and its terminal is 3 miles north of the city, located so that the transfer of freight by water will be difficult for Syracuse manufacturers unless the old Erie Canal is continued in use. The latter is not likely to happen, so that a great work will be provided for large numbers of big-capacity trucks.

Rochester Scorns Distances

Manufacturers All Locating at Distance from Center of City—New Transportation Plans

ROCHESTER, N. Y., Oct. 3—Motor truck delivery is the accepted, the indispensable, thing in Rochester. Its use has changed the industrial life of the city. It has enabled Rochester manufacturers to expand their plants, to build airier and lighter plants, and, withal, to save money. This is all because Rochester is progressive. Because she is progressive she has first provided good pavements; then she has built her factories out on the outskirts of the city and adopted motor trucks for local transportation.

Formerly Rochester factories, like those in most of the older cities, were centrally located. They had to be, because they had to depend upon horse transportation, which cannot go far or fast. Rochester was not always progressive; rapid transportation has made her so. Some 1500 commercial vehicles are principally responsible.

An Invisible Bridge

The main street of the city—named Main street, of course—incorporates a feature which is a curiosity in this country, although common in the sixteenth-century cities of Europe. There is an invisible bridge over the Genesee River in the heart of the business district. The river is a rollicking, turbulent affair which is worthless for transportation, having two cataracts in the city limits. But it is wide and at the bottom of a small gorge considerably below the grade of Rochester streets. The Main street bridge, therefore, is a low and wide span, supported by many arches and lined with business blocks on either side, so that the river is entirely hidden from view.

May Use Old Canal

Part way along the Genesee bed is the Erie Canal. It is at very nearly the street level, so that just south of the Main Street bridge, where it branches off to the northwest, it crosses it on an aqueduct. The canal at this point is an interesting piece of engineering, but it is little used. The terminal of the barge canal is to be located near the aqueduct, and they are talking of making the Erie bed an open subway for a right-of-way for the interurban cars, thus reducing street congestion and bringing distant suburbs many minutes closer to market.

Who cares for canals, anyway, nowadays, when all of the factories are located or are locating out among the farms, where sites are cheap, where the workers can find economical and healthful living instead of slums, when rapid transit by interurban car, by motor car and bus, and quick and economical hauling and deliveries are rendered by commercial vehicles?

People living in a radius of 25 miles shop in Rochester. Easy transportation and improved deliveries are increasing the tendency. Rochester people are getting back to the land—moving out into the suburbs for their children's sake, many of them owning cars and being thus independent of street cars, to whose crowded routes they were formerly constrained to adhere. Improved suburban delivery begets improved city delivery. Those who live close by are getting four deliveries a day.

Much Local Expressing

Much of the delivery to the more distant suburbs is made by local parcel expressmen living in the suburbs and making trips to and from the city daily or oftener, delivering for a number of firms in the city.

Market gardeners are coming to Rochester from greater distances than before, which means that they are bringing in more stuff. Profiting by the example of Rochester firms which deliver by truck, the farmers are learning the advantage of motor haulage of their products. Gardeners who formerly accepted a lower price at country markets or from commission merchants receiving their crops by rail rather than make the tedious haul into the city now drive in with their produce in fresh and price-commanding condition in less than half the time formerly required, having substituted trucks for horse wagons.

Agricultural Resources

The market-gardening industry contiguous to Rochester is one of importance, since the soil is very fertile and along the lake is one of the best peach regions in the country. There are miles of green-houses in this district, and most of the so-called Boston head lettuce comes from the Rochester market. Celery and other hot-house products are shipped all over the country.

Rochester is also an important coal-shipping point. Pennsylvania coal is shipped west by water from the port of Charlotte, 7 miles north of Rochester, the water transportation being cheap and this route involving the shortest rail haul.

There is a great deal of heavy hauling over the streets of Rochester, due to the fact that so many of the plants are lo-

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cated remote from the wholesale district or the freight terminals. Then, too, many of the manufacturers have several plants at different parts of the city, between which the only practicable method of transportation is the motor truck.

A City of Distances

For example: The Eastman Kodak Co. has eight plants in various parts of the city. The Bausch & Lomb optical works, which supply lenses to the Eastman company, are some distance from the various Kodak plants. The Foster-Armstrong Piano Co. has its plant in East Rochester, about 7 miles out. The Symington company, a railway supply house, is in a very different part of town. The Stromberg-Carlson telephone factory is 2 miles away in another direction. The Todd Protectograph Co. has its factory 2 miles away. Adler's clothes are made in a plant 1½ miles from the business district. The General Railway Signal Co. is located at Lincoln Park, 4 miles away. The Standard Oil plant is 5 miles away. Other prominent concerns who are located more or less remotely are the Rochester Stamping Co., Commercial Paper Box Co. and the Northeast Electric Co.

Although we usually think of Lynn, Mass., when shoes are mentioned, nevertheless Rochester is an important shoe-manufacturing center and shoemakers all over the world, including those in Lynn, use lasts made in Rochester. There are forty-six shoe factories in Rochester. Woodworking products to the value of $6,000,000 are made here, the American Woodworking Machinery Co. being in Rochester. The Yawman & Erbe Mfg. Co. and other important office supply firms are in Rochester.

Streets Well Paved

Physical conditions favor the use of trucks. Rochester streets are well paved for the most part, being asphalted generally except in the business district, where well-laid granite block is wisely used to withstand the heavy traffic which prevails. Heavy snows in February and March make the operation of horse equipment exceedingly difficult, which is a factor which counts heavily in favor of the truck.

Industrial Buffalo Motors

Niagara Valley, Eastern Lakes Region and Western New York Depend on Buffalo Market

BUFFALO, N. Y., Oct. 4—Importance as a motor-truck-manufacturing city is by no means the principal reason for the extensive employment of commercial vehicles by Buffalo commercial and manufacturing firms, for Buffalo is one of the largest ports in the world and is the distributing center for a large area in its own State of New York, in Pennsylvania and in Canada. In meat packing, lumber, grain and its products, and soap Buffalo is of world-wide importance. All of these industries are employers of a large number of workers, and all require a great deal of transportation over the streets, supplied to an impressive extent by motor.

Buffalo Streets Good

There are 395 miles of paved streets in Buffalo, mostly in good condition, and throughout Erie County and the western end of the State are excellent State highways. Erie County has 2773 commercial motor vehicles, most of which are in and practically all of which are used in the commerce of Buffalo.

As the western terminus of the new barge canal, the port through which all of the lake traffic from Lake Ontario to Lake Erie and reverse must pass, and itself an important terminal of an extensive lake traffic connecting with both American and Canadian railroads, Buffalo's commercial importance is more than local. The lake freight traffic reaches a tonnage of 20,000,000 annually.

Where Bryan Gets It

The Erie County farming industry is important, its products being fruits, potatoes, forage, berries and garden truck, most of which is marketed in Buffalo. In this work motor trucks are coming into wide use among the farmers. The Chautauqua grape industry, which engages much of the agricultural enterprise of the country to the south of Buffalo, depends almost entirely upon Buffalo as a general buying center, and much of its product is distributed through Buffalo.

North of Buffalo are two important industrial sections, Tonawanda and Niagara Falls, attracted by the cheap and abundant electrical power generated by the falls. Niagara Falls, too, is an attraction to a large volume of tourist traffic, normally from the whole world.

The Falls is about 20 miles from the business district of Buffalo, yet beyond its resorts and industrial plants it looks mainly to Buffalo as the city. Most of the shopping in the whole territory is done in Buffalo, and motor trucks are making the deliveries where formerly freight and express shipments were relied upon.

Names You Know

Among the more important manufacturing establishments in Buffalo are the Larkin Co., manufacturer of soaps, toilet articles, food products and premiums; the Pierce-Arrow Motor Car Co., Cyphers Incubator Co., Buffalo Pitts Co., maker of road, agricultural and contractors' machinery; the Snow Steam Pump Co., the Republic Metalware Co., the F. N. Burt Co., largest paper-box maker in the world; Schoellkopf, Hartford & Hanna, coal-tar dye producers; the Ontario Biscuit Co., Buffalo Gasoline Motor Co., Crosby Co., sheet-metal stamper; Buffalo Forge Co., and the American Radiator Co

The iron and steel industry is prominent, being represented by the Rogers-Brown Iron Co., the Lackawanna Steel Co., the Wickwire Steel Co. and the Buffalo Union Furnace Co.

In the motor truck industry there are the Automatic Transportation Co., the Atterbury Motor Car Co., the Lippard-Stewart Motor Car Co., the Pierce-Arrow Motor Car Co. and the Stewart Motor Corp. The Houk Mfg. Co., maker of wire wheels; the Fedders Mfg. Co., radiator maker, and the Curtiss Aeroplane Co. are in Buffalo.

Buffalo is the shipping point of most of the aluminum in the world. There are thirteen large brewing and malting companies and six manufacturers of malt. There are nine flour mills and six meat packers.

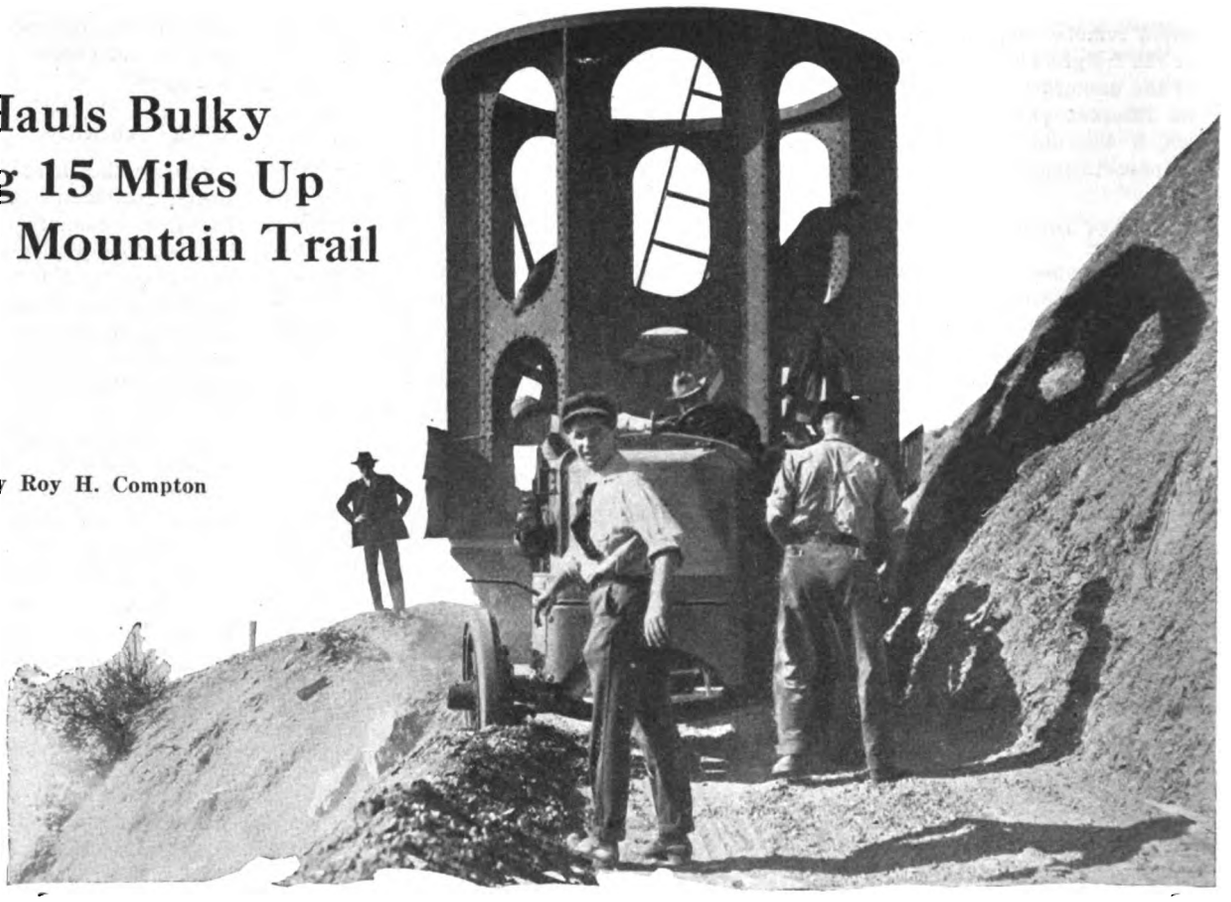
In the Tonawandas and Niagara Falls are such large industrial plants as that of the Tonawanda Iron & Steel Co., the Buffalo Bolt Co., the Carborundum Co., the Shredded Wheat Co., the International Acheson-Graphite Co. and the Union Carbide Co. In Lockport are the Simonds Mfg. Co. and the United Paperboard Co.

Molasses Distillate As a Motor Fuel is receiving considerable attention in Natal, South Africa, where a company under the name of the South African Natalite Motor Spirit Co. has been formed. It is expected that the new concern will build a complete plant including all the necessary buildings required to make in the aggregate 2,000,000 gal. of natalite per annum, and to do this at the rate of 6000 gal. per day. Experiments were made in Natal with the new fuel on a 22 hp. motor vehicle weighing 3600 lb. It was tested out over several routes, the total distance covered being slightly more than 500 miles. The amount of the new motor fluid used was 30.59 gal., or an average of 16.4 miles per gal., or 26.2 ton-miles per gal. It is said the valve caps and valve heads were found to be clean after the trial and that the engine started easily on all occasions whether it was cold or warm.

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Truck Hauls Bulky Casting 15 Miles Up Snaky Mountain Trail

By Roy H. Compton



THE ROADBED . . . IS SO NARROW THAT THE WHEELS OF THE TRUCK . . . HAD TO BREAK THEIR OWN PATH NEARLY ALL OF THE WAY

HAULING of a load of 20,185 lb. to the summit of Mount Wilson, near Pasadena, Cal., a model AC Mack truck of a rated capacity of 3½ tons bore its burden a total distance of 15 miles, almost 10 of which were mountain trail of an average gradient of 12 per cent and several pitches of as high as 18 and 20 per cent.

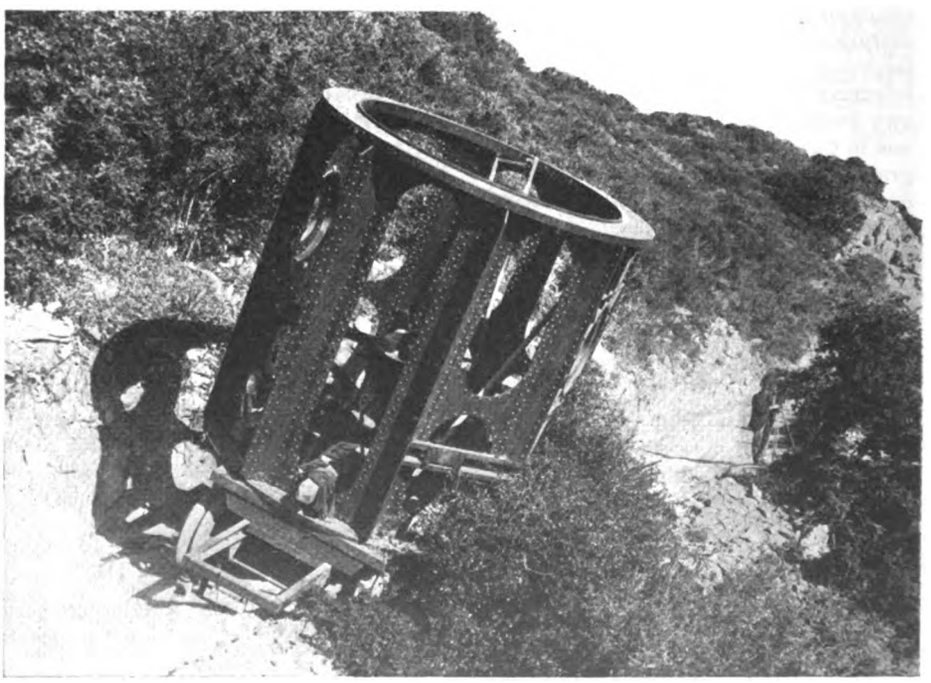
The load was the bottom section of the 100-in. telescope being erected by the Carnegie Institution in its new solar observatory on the summit of the mountain at an elevation of 6000 ft. above sea level. The section measures 11 ft. 4 in. by 11 ft., and it was bolted onto a cradle of 8-in. planking that in turn was bolted to the chassis frame.

Although not the greatest weight that has been taken up the mountain by truck, it was the most difficult to handle because of its shape. J. A. Stoner, manager of the Mack Motor Truck Co. of Los Angeles, who drove a 6½-ton Saurer truck carrying a 13-ton steel girder 24 ft. long up the trail twice last year, was at the wheel of the Mack truck also.

Some idea of the enormous bulk of the telescope base can be gained from the fact that it is so huge it could not be brought overland by railroad train because, when loaded on a flat car, it would not pass through the tunnels in the mountains. It was brought around Cape Horn by boat and had been at Pasadena a year awaiting progress on the observatory that would make it needed in the building operation.

The Mount Wilson trail is one of the most tortuous in the country. It has been literally chiseled out of the side of the mountain. The roadbed is of decomposed granite that when the truck made its trip, Sunday, Oct. 29, had been rutted badly and softened along the edges by recent rains. It is so narrow that the wheels of the truck, which were equipped with Gibney tires, had to break their own path nearly all of the way.

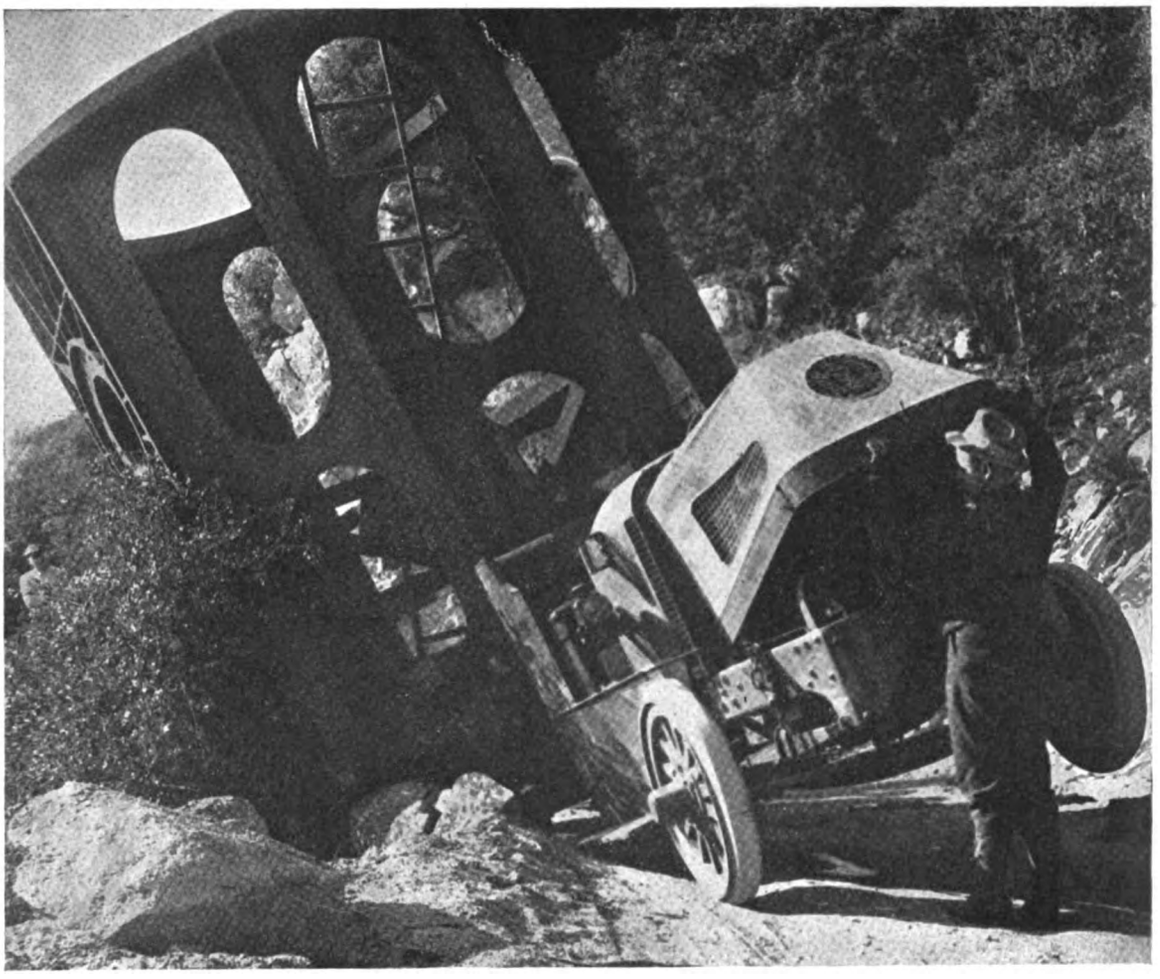
From the standpoint of the spectacular, the performance of the Mack under its great load was a thriller. The motion picture weekly people had



STONER HEADED IN FOR THE BANK, BUT THE SIDE SWAY COULD NOT BE OVERCOME AND ALMOST INSTANTLY THE EDGE OF THE ROAD GAVE WAY FROM UNDER THE WHEEL

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anticipated something out of the ordinary, and a battery of three cameras played on it at frequent intervals clear to the summit. The load swayed from side to side, at times the top being more than 2 ft. further over the precipice than the base. It rolled exactly as a ship at sea.



IT SEEMED AS IF THERE WERE NO WAY POSSIBLE TO PREVENT THE LOAD AND TRUCK FROM OVERTURNING AND FALLING THOUSANDS OF FEET

On several occasions the load would not clear the rock bluffs and leave the outside wheels of the truck on the trail. In these instances it became necessary to hook another Mack truck on ahead, and with the combined power of the two hurl the casting against the granite, breaking it down and clearing the way. Dozens of tons of solid rock were torn out in this manner, although the observatory authorities had tried to make provision by working on the trail for days in preparation. This rock had to be pushed over the brink before cars following the truck could pass. Dozens of telephone poles and small trees were shattered and knocked down as the truck went on its way.

Disaster almost overtook the expedition when within ¼ mile of the summit. In trying to avoid an overhanging ledge of rock on the left-hand side of the road the right rear wheel was thrown to the outer edge. Stoner headed in for the bank, but the side sway could not be overcome and almost instantly the edge of the road gave way from under the wheel. As they felt it careen to the side all those riding on the truck at the time leaped for their lives.

It seemed as if there were no way possible to prevent the load and truck from overturning and falling thousands of feet. But fate played fair with higher education. The left rear wheel hooked over a granite boulder imbedded in the road. It held. The right rear wheel settled rapidly and within a few minutes half the wheel, brake drum, sprocket and chain were buried, with the axle driven firmly into the roadbed. The left front wheel was 2 ft. off the road and the strain thrown on the truck in this position was incalculable.

A block and tackle was hastily rigged and the top of the load moored to a cluster of scrub oaks. Everything depended on the solidity with which the roots of those little trees had permeated the rock. They made good in the emergency, and in a few minutes the truck was relieved of some of the weight of the overbalanced load. Jacks were put under the truck and load at several points. The rear wheels were raised and blocked up until the right rear rested on solid planking 4 ft. high.

The situation was so precarious and the angle of the planking to the road was such that there could be no attempt made to start the motor as any vibration might plunge everything over. The truck that had preceded the load was backed against the mountain side, loaded with everything available, including humans, and moored there with the brakes set. A block and tackle was rigged from this truck to the right frame member of the one carrying the load and the line passed back beneath the latter to twenty pairs of helping hands. To the merry ye-ho, the crowd pulled, and inch by inch the total weight of truck and load, 28,305 pounds, was dragged onto the firm road. The motor started on the first attempt, and five hours after everything seemed lost, the journey to the top was resumed and accomplished in safety.

The truck used was a standard AC model, with a gear ratio of 29 to 1 on low. The governor had not been removed and the maximum speed of the motor was 1000 r.p.m. The speed of the truck under its load was really too much, as it made taking the turns perilous and the steering was unusually difficult, as 55 per cent of the load rested on the front wheels. That had to be as the load would not have cleared in any other position.

ERRATA

Make your November 1, Forecast Issue, 100 per cent. accurate by using pages 35 and 36 of this issue.

Of course you are saving your November 1 issue. It is the standard technical reference of the American commercial vehicle industry.

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Get Together on Fuels

WITH gasoline selling at 20 cents a gallon, fuel becomes a 33 1/3 per cent factor in the cost of operating a motor truck in many fields of service. In some it is below this figure, in others above it. Fuel has become a much more critical factor in truck operation in the last few years than was foreseen by truck makers and petroleum producers. A year ago we had a taste of what happens in fuel prices when an oil-producing basin suddenly slows up as occurred in the Cushing pool in Oklahoma. Similar happenings may occur at any time. In a day a new condition of affairs is thrust over a great industry. This is playing too close to trouble.

As a suggestion: Every truck maker and the truck industry as a whole should be hand-in-glove with the fuel manufacturers. They should have a common committee to handle this question of motor fuel, including motor-truck fuels and passenger-car fuels. By working hand-in-hand, the truck maker will always know what is coming in the fuel situation. Why should it all be left to the fuel producers? Why should they one day suddenly decide to put a certain standard of gasoline on the market, without as much as finding out from the entire industry how it is going to affect operating conditions. If oil producers cannot foresee conditions more than a day or a week, so far as the available crude supply is concerned, then truck makers and gasoline makers should arrange for some storage system that would avoid a serious crisis due to an unexpected shortage of crude through failure of wells.

It is not impossible to think of truck makers and gasoline makers settling a year in advance regarding a new grade of fuel that by necessity will have to be used. That gives engine manufacturers, carbureter manufacturers, etc., an opportunity to weigh the matter and settle it fairly and honestly as the situation demands. If a lower test of fuel has to be used truck makers and gasoline makers should decide upon it in common. Why should the gasoline producer handle it himself and not give the truck maker any more notice than the consumer gets? Fuel is a vital question to-day. It is more important that truck makers get together on it than that they arrange themselves in sundry camps for the express purpose of pushing certain features of truck design which do not mean so much to the consumer as the question of fuel.

An Epochal Argosy

WHEN the railroad strike seemed imminent, commerce was threatened with paralysis through lack of overland transportation. But in Chicago, whose civic motto is "I Will," was a firm which did not know how to say die.

In short, Thomas E. Wilson, president of Wilson & Co., important meat packers and formerly Schwartzchild & Sulzberger, later Sulzberger & Sons, determined to substitute an overland truck line for rail transportation. When, happily, the strike was averted, Wilson determined to prove the soundness of his plan notwithstanding. He accordingly sent a train of motor vehicles comprising not the expected fleet of trucks, but one truck and an escort of Ford salesmens' cars from Chicago to New York.

The trip was made, which is not at all remarkable, and thirty fancy hams were distributed, together with thirty letters, from Mayor Thompson of Chicago to thirty mayors along the route. By sending this one truck across, a distance of 1373 miles in 18 days, with a large number of stops and but one driver for the entire route, Mr. Wilson has proven that, given a sufficient number of trucks, the entire output of Majestic meats could be similarly transported.

What one truck can do, 1500 can also do.

There was no attempt at a record. The truck was a 2-ton Autocar belonging to the Wilson company. Schedules had been laid out, however, so that had it been necessary long trains of motor trucks, organized along similar lines to those in use by the U. S. Army on General Pershing's expedition, with relays of drivers, could have made deliveries in quantities to Toledo in 20 hr.; Cleveland in 24.

This thing of motor trucks substituting for railroads is not an idle fancy. It is a practical possibility, recognized as such by some of the keenest business minds of the country. Even with the railroads running normally, there are fields in which the truck can profitably be substituted for them. A great motor circus is going on the road in the spring. It will also be an epochal venture.

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Greater Pierce Company Is Formed

Same Organization Except Clifton Succeeds Birge

NEW YORK CITY, Nov. 8.—The Pierce-Arrow Motor Car Co., Buffalo, N. Y., will be taken over by the Pierce-Arrow Motor Car Corp., which has been formed with 100,000 shares of 8 per cent convertible preferred stock and 250,000 shares of common without par value. A syndicate of New York bankers, headed by J. & W. Seligman & Co., will underwrite the new issues.

The new capital will be used to increase the factory facilities.

George K. Birge, now president of the company, and prominent in the wallpaper business, will retire, and Col. Charles Clifton, now treasurer of the concern and for several years head of the N. A. C. C., will succeed him. Otherwise there will be no change in the organization.

VELIE TO CONSOLIDATE

MOLINE, ILL., Nov. 6.—A special meeting of the stockholders of the Velie Motor Vehicle Co. will be held Nov. 14 at Moline, Ill., to consider a proposition to consolidate with the Velie Engineering Co. under a single corporation under the style Velie Motors Corp., with a capital stock of $2,000,000.

REPUBLIC TRUCK SHIPMENTS GAIN

ALMA, MICH., Nov. 3—Shipments of the Republic Motor Truck Co. in October amounted to 626 trucks, compared with 190 in 1915 and thirty-five in 1914. For the first 10 months of this year the shipments were 4902 trucks, against 1442 in the corresponding period of last year.

BIG 1917 EMPIRE AXLE OUTPUT

DUNKIRK, N. Y., Oct. 30—That the motor car and truck axle manufacturing companies are sharing in the general prosperity of the country is manifested in a statement made by the Empire Axle Co. that it will put out as many axles in the first 4 months of the coming year as it did in the whole year of 1916. It has increased its daily capacity in worm drive axles more than 400 per cent over that of a year ago.

Increased demand and production necessitated an increase during the year of 54,600 sq. ft. in its factory space, centered mainly on three new buildings, 85 by 110; 30 by 50; and 85 by 100. The first building is being used as an assembly plant, tool making and some machine work; the second is an addition to the assembly plant, used as a forge shop; the third is not yet built, but will be used for the machining of castings, etc. Preparations are also being made for an office building separate from the factories.

Keeping in line with the general improvement in working conditions in the modern factory, the company has made several important installations to its plant. Scientific sanitary facilities for its employees in the way of steel lockers, shower baths, and special lavatories have been added; also bulletin boards displaying new safety-first ideas, safety appliances and guards on all machinery and many other improvements.

The gradual increase in its business has made necessary two shifts throughout the plant. The heat treating department has been operating night and day for the last 6 months. The power plant has not been idle for more than 1 hr. at a time with the exception of holidays, since May, 1915.

LIGHT TRUCK IN FINDLAY

FINDLAY, OHIO, Nov. 2—Robert Kirk has purchased from the board of education the central school building, which will be remodeled into a plant for the manufacture and assembling of light delivery trucks. It is the intention of the purchaser to organize a company to carry on the business.

Steinmetz' Electric To Be Built

Dey Electric Corp. to Produce Low-Priced Utility Car

NEW YORK CITY, Nov. 8.—The low-priced electric utility vehicle which Dr. Charles P. Steinmetz, engineering authority of the General Electric Co., has been advocating for several years seems near the point of realization. Such a vehicle will be manufactured by the Dey Electric Corp., with offices at 45 Broadway, N. Y. This concern has engaged show space for the Grand Central Palace show, New York, where these new electric vehicles will be on display, and it is planned to have production under way for the 1917 market.

A comprehensive line of what is described as the lightest, lowest-priced and highest efficiency electric vehicle ever built will be manufactured. The Dey company has secured a factory in the Metropolitan zone, and will specialize on a runabout intended primarily for utility work, such as solicitors, etc. The car is not a passenger type, nor yet a truck, but essentially a utility vehicle. In addition to this runabout a closed type of passenger vehicle will be produced. The company will manufacture what might be termed a utility chassis suitable for taxicab purposes, as well as passenger bodies and light truck uses.

I. M. C. Reorganizing Plan Approved

New Company to Be Formed and Capital Increased

NEW YORK CITY, Nov. 6—The reorganization plan of the International Motors Co. has been approved by the stockholders and creditors, over 93 per cent of the preferred and 94 per cent of the common being deposited with the two committees. A reorganization plan was adopted in September by which a new company of the same name will be formed to take over the present concern. Additional capital of $1,500,000 was raised and the $2,881,000 notes maturing the first of this month was obliterated.

By this plan the new company's securities will be exchanged on an equal basis for those of the present organization and will consist of $4,381,000 in 7 per cent cumulative first preferred stock, $2,723,000 second preferred and 53,638 shares of common of no par value. Of the first preferred, $2,881,000 is to go to the holders of the notes at par, and the balance will be issued for cash to provide working capital, being offered to stockholders at par with common stock thrown in. Holders of the present $3,600,000 preferred will receive 60 per cent in new second preferred and 10 per cent in new common. For the outstanding $5,628,000 common, 10 per cent in second preferred and 10 per cent in new common is to be exchanged.

FIRESTONE TO HAVE $15,000,000

AKRON, OHIO, Nov. 3.—An increase from $4,000,000 to $15,000,000 in the capital of the Firestone Tire & Rubber Co., this city, was authorized yesterday by the stockholders. Two-thirds of this will be preferred and one-third common. Of the preferred, $5,000,000 is to be outstanding for the present.

The $5,000,000 preferred stock has been underwritten by the Cleveland Trust Co., the price to net the Firestone company par.

PACKARD DEALER ELECTED TO CONGRESS

BOSTON, MASS., Nov. 11—Alvan T. Fuller, who has the agency for Packard trucks and cars in eastern New England from Portland, Me., to Providence, R. I., with headquarters at Boston, was elected to Congress from Massachusetts last Tuesday. The fact that he went in on a Progressive-Independent ticket and that Congress is evenly divided makes his vote loom up very big, and he may be the deciding factor in the choice of a Speaker. He defeated Ernest W. Roberts, who had represented the district for 18 years successively and was considered so strong in the Republican district that the Democrats did not put up a man to oppose him. Mr. Fuller, having been successful as a candidate for Representative to the Massachusetts Legislature as a Progressive, decided at the last minute to enter the fight rather than have Mr. Roberts go back unchallenged.

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Twelve Truck Makes at R. I. Show

Trucks, as Usual, Relegated to the Dark, Deep Cellar

PROVIDENCE, R. I., Nov. 10—The eighth annual automobile show of the Rhode Island Automobile Dealers' Association opened here to-night in the big State armory. It will continue all through next week. There was a good attendance. Many dealers were present from Boston, for they have interests in some of the Rhode Island agencies, and a lot of the dealers from all over the State and also southern Massachusetts were present. There are forty-five makes of passenger cars and twelve makes of commercial vehicles. The cars have the main floor and the trucks the basement. There is a wide variety of commercial vehicles, although the number of makes is not large. Those exhibiting in the commercial section comprise:

Arter, Roland E.....Federal
Crane, Harold C.....Chase
Foss-Hughes Co.....Pierce-Arrow
Hopkins, B. F. & A. W..Reo and I. H. C.
Kenworthy-Clark Co.....Studebaker
Knight Auto Co.....White
McCormick, Joseph.....Peerless
O'Donnell, John.....Republic
Packard Motor Car Co.....Packard
Pugh Brothers Co.....Overland
Vim Truck Sales Co.....Vim

M. A. M. BANQUET JAN. 10

NEW YORK CITY, Nov. 3.—The Motor and Accessory Manufacturers will hold their annual banquet at the Waldorf-Astoria Hotel, this city, on Jan. 10. W. M. Sweet, former manager and now assistant to the president of the United Motors Corp., has been elected chairman of the banquet committee.

BRAKES, PENN. S. A. E. TOPIC

PHILADELPHIA, PA., Oct. 27—John W. Watson, president of the American Bronze Co., Berwyn, Pa., was elected chairman of the Pennsylvania section of the Society of Automobile Engineers at its annual meeting held here last night. A. K. Brumbaugh, assistant engineer, Autocar Co., Ardmore, Pa., was elected secretary and T. Y. Olsen, vice-president the Tinius-Olsen Testing Machine Co., Philadelphia, treasurer.

Herbert Chase, chief engineer of the Automobile Club of America, read a paper on the Otto versus the constant pressure cycle, supplementing his paper on the same subject presented before the Summer meeting of the society.

The next meeting of the section will be held Nov. 23, when John Younger, chief engineer, motor truck department Pierce-Arrow Motor Car Co., Buffalo, N. Y., will present a paper on brakes.

MORE LAW TALK AT TRUCK CLUB

NEW YORK CITY, Nov. 9—"Proposed Legislation in New York State" will again be the general topic of the Motor Truck Club at its November meeting, to be held at the Automobile Club of America on Nov. 15. Hon. Edwin Duffey, Commissioner of Highways of the State of New York and one of the committee of three named in a special law passed by the New York Legislature last winter to prepare a schedule of fees on motor vehicles on "the basis of the time and extent of their use on the public highways and the relative wear and tear of the public highways by reason of their use thereon," will be the speaker of the evening.

Prof. Arthur H. Blanchard, consulting highway engineer of the National Highways Assn., Board of Water Supply of New York, etc., will present a paper entitled "Road Building for Motor Trucks." This paper will be illustrated with stereopticon slides.

Charles G. Bond, counsel for the club, will make a report on the progress of the proposed regulations in New York State.

KETTERING TO TALK TO METROPOLITAN S. A. E. NOV. 16

NEW YORK CITY, Oct. 28—The Metropolitan Section of the Society of Automobile Engineers will hold a meeting Nov. 16 at 8 p. m. at the Automobile Club of America. "Some Present and Future Scientific Problems of the Automobile" will be the subject of C. F. Kettering's address. Mr. Kettering is vice-president and general manager of the Dayton Engineering Laboratories Co., Dayton, Ohio.

H-B AND S.K.F. BOUGHT

NEW YORK CITY, Nov. 14—A group of New York financial men has purchased control of the Hess-Bright Mfg. Co., Philadelphia, Pa., manufacturer of Hess-Bright ball bearings. This group also has a substantial interest in the S. K. F. Ball Bearing Co., Hartford, Conn. The combination of control, however, is purely a financial transaction and the two plants, with their present officers will continue business as before.

The Conrad patent, owned by the Hess-Bright company is retained, but by the merging of control, the S. K. F. becomes a licensee. Others having the privilege of manufacturing under the patent are the New Departure, Standard Roller, Gurney, U. S. and Fafnir companies.

Coming Commercial Vehicle Events

Nov. 15.....New York City, Monthly Meeting of the Motor Truck Club of America, Automobile Club of America, 247 West Fifty-fourth Street.
Nov. 15.....Newark, N. J., Monthly Meeting of the Motor Truck Club of New Jersey, New Jersey Automobile Club, 22 Washington Place.
Nov. 10-18.....Providence, R. I., Annual Motor Vehicle Show.
Nov. 16.....New York City, Monthly Meeting, Metropolitan Section, S. A. E., Automobile Club of America.
Nov. 23.....Philadelphia, Pa., Monthly Meeting, Pennsylvania Section, S. A. E.
Dec. 7-9.....Baltimore, Md., Second Annual Convention, Safety First Federation of America.

1917

Jan. 9.....New York City, Mid-Winter Meeting, S. A. E.
Jan. .....New York City, Annual Banquet, M. A. M., Waldorf-Astoria Hotel.
Jan. 10.....New York City, Annual Banquet, S. A. E., Hotel Biltmore.
Jan. 13-20.....Montreal, Que., Can., Montreal Motor Show.
Feb .....Newark, N. J., Passenger Car and Motor Truck Show, First Regiment Armory.
Feb. 3-10.....Minneapolis, Minn., Tenth Annual Auto Show.
March 3-10.....Boston, Mass., Fifteenth Annual Motor Vehicle Show, Mechanics' Building.

United Motors Takes in Houk Wheel

George W. Houk Continued as Manager of Division

BUFFALO, N. Y., Nov. 6—The Houk Mfg. Co., maker of Houk wire wheels, has been purchased by the United Motors Corp., which brings the total number of concerns owned by this corporation up to nine. As with its previous purchases the Houk company will continue as a separate manufacturing organization, and George W. Houk, founder of the Houk company and the one person in the U. S. A. responsible for the present status of wire wheels, will continue as manager.

ROADS AND GENERAL PROSPERITY

NEW YORK CITY, Nov. 4—Increases of land value ranging from 25 to 194 per cent and reduction of hauling costs from 33½ cents per ton-mile to 15.7 cents, due directly to road improvement in eight counties, prove conclusively that dirt is not cheap, when that dirt is on the highways.

These and a number of other interesting and important facts are presented in a bulletin of about 150 pages just issued by the Department of Agriculture under the title "Economic Surveys of County Highway Improvement." The work is an analysis of results obtained from road improvement in four counties in Virginia and one each in New York, Alabama, Florida and Mississippi, during a period of five years.

Following improvement of the main market roads, the selling price of tillable lands served by the roads increased from one to three times the total cost of the improvements. The gross annual saving in hauling costs due to the good roads amounts to $627,409 for a traffic of about three and one-half million ton-miles, while the net saving, after deducting the cost of interest and principal for road work, averages 11.6 cents per ton-mile for hauling.

Before the roads were improved the average school attendance was 66 pupils in each 100 enrolled, as compared with 76 after improvement. Thus, ten more children in every 100 are enabled to secure an education as a result of better roads.

GASOLINE PUMPS INACCURATE

WASHINGTON, D. C., Nov. 6—The Bureau of Standards has in circulation report No. 81 on liquid measuring-pumps for selling gasoline. The report, in addition to a description of the different systems, gives results of some inspections having to do with the accuracy of these pumps.

Of seventy-nine measuring systems of various types chosen at random and tested in a number of different cities, fifty-five, or 70 per cent, had errors in excess of the tolerance allowable, and twenty-four, or 30 per cent. had errors within the tolerance. In addition, there were eight outfits so constructed as to be absolutely unsuited for retail liquid dispensing.

SAFETY FIRST CONVENTION

BALTIMORE, Nov. 6—The second annual convention of the Safety First Federation of America will be held in this city Dec. 7 to 9. The tentative program

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includes various subjects, including uniformity in street traffic regulation.

Of the fifty-five out of tolerance 80 per cent gave deliveries in deficiency and 20 per cent in excess. This tendency toward deficient measurement is worthy of careful consideration, and it is only proper to call attention to the fact that most of the causes of error in measuring-pump operation tend toward the side of deficient delivery. Among these may be mentioned leaks, retention of liquid by the hose, excessive virtual suction head, resulting in vaporization and other losses, failure to complete the full stroke and slippage.

STANDARD TAKES OBSOLETE U. S. PARTS

NEW CASTLE, IND., Nov. 2—The Standard Motor Parts Co., this city, has taken over the entire parts business of the defunct United States Motor Co. from the Maxwell Motor Co., including old model Maxwells, Sampson trucks, Stoddard-Daytons, Brushes, etc.

SALES EFFECTS OF DESIGN AND PERFORMANCE

NEW YORK CITY, Nov. 2—Analysis of the sales of the new model Mack trucks by the International Motor Co. reveals that features of design are accountable for the majority of sales for the first 18 months of their existence, but that from that time on the reputation earned in the hands of owners serves as the reason for the majority of sales.

This general principle is illustrated in the case of the Mack models by the fact that the AB models, of from 1 to 2 tons' capacity, from January, 1915, when they were first placed on the market, increased in sales gradually until about August of the same year, when their showing in performance brought on an accelerating rise in sales, so that up to the present time the sales on performance exceed those due to design.

In about the same manner the sales of the larger AC models, of from 3½ tons up, progressed at a gradual rate from their inception in October, 1915, until the end of May of this year, when performance caused their sales to increase at an accelerating rate.

U. S. GARAGE FOR 800 TRUCKS

SAN ANTONIO, TEX., Nov. 2—At Fort Sam Houston the United States Army expects to build a garage for 800 trucks as winter quarters for the army truck trains now on the border. Twenty-five companies of thirty-three trucks each are expected to arrive here within a short time. This garage will unquestionably be the largest garage in this country, if not in the world.

Decreased War Orders Lessen Exports

England, France and Russia Get Most of the Vehicles

WASHINGTON, D. C., Nov. 1—Truck exports in September, 1916, were less than those in the same month of last year. That the falling off has been greater in numbers than in value shows that presumably larger trucks are being bought now than then. Decrease in war orders is directly the cause of the falling off of exports.

During September, 1916, 1835 trucks, valued at $5,203,215, were shipped to foreign countries. In September, 1915, 2,227 trucks, worth $5,882,255, were exported. That September has not been greatly different from other months of 1916 is indicated by the figures for the 9 months of the two years.

From Jan. 1, 1916, to the end of September the exports totalled 14,773 trucks, valued at $40,371,055. For the corresponding period of 1915, 17,269 trucks, valued at $47,769,216, were exported.

During the 12 months ended June 30, 1916, there were shipped to foreign countries, not including American possessions, 21,265 commercial vehicles valued at $56,805,548 and 56,234 passenger cars valued at $40,660,263. England, France and Russia took nearly all of the trucks, 19,028.

Los Angeles Sees 18 Truck Exhibits

Miners, Ranchers and Foreign Buyers Attend Show

LOS ANGELES, CAL., Nov. 7—A larger display, greater number of makes as well as trucks, more attention to body work, and attendance from a widely distributed territory were outstanding features of the truck exhibit in connection with the Los Angeles automobile show. Mining men and ranchers were among the most interested investigators of trucks. As yet these two fields bave hardly been touched by the motor truck; but there are enough successful truck operators in this class of service to arouse interest, while the show gave an impetus that will result in great progress the coming year. Attendance also included visitors from Mexico, the west coast of South America, the Hawaiian Islands and Australia. During the show the Los Angeles Trailer Co. received an order for Utility trailers for export to Chile.

Demand for space at the show so far outran anticipation that several important makes were not put in but featured in special displays at the dealers' salesrooms, to which attention was called by energetic newspaper advertising. Nearly all the exhibits were cut to smaller proportions than the dealers desired by the lack of space. And it was a big show, too, and a very live one; for example and comparison, much more active than the truck show in Chicago 3 years ago.

Following is a list of the dealers and trucks at the Los Angeles show, Oct. 28 to Nov. 4:

Smith Brothers: One Peerless 4-ton chassis.

William E. Bush: One Pierce-Arrow 2-ton chassis, one Pierce-Arrow 5-ton dump truck.

J. A. Stoner, Mack Motor Truck Co.: One Mack 1-ton chain-drive chassis, one Mack 3½-ton chassis, one Mack 5½-ton tractor, one Mack 2-ton worm-drive chassis, one Saurer 5-ton chassis and the 3½-ton Mack truck that hauled 20,185-lb. load of structural steel to the summit of Mount Wilson the second day of the show.

Moreland Motor Truck Co.: One Moreland 5-ton chassis, one Moreland 4-ton dump with brilliant yellow paint for Coast Construction Co., one Moreland 1½-ton chassis.

D. F. Poyer: One Republic ¾-ton truck with prairie schooner body, which transported 1½-ton camp equipment from Michigan to Los Angeles, property of Edgar Rice Burroughs, sportsman and author; one Republic ¾-ton chassis, one Republic 3-ton chassis.

Earle C. Anthony, Inc.: One Packard 1-ton chassis, one Packard 3-ton truck with special stake body for grain, produce, etc., exhibit of photographs showing trucks in service, one Reo ¾-ton delivery body, Youngs Market Co., owner, one Reo ¾-ton chassis.

Kimball Truck Co. of Los Angeles: One 4-ton Kimball assembled truck equipped for burning distillate fuel.

Studebaker branch: One Studebaker sixteen-passenger bus, one Studebaker station wagon, one Studebaker all-inclosed delivery car, one Studebaker 1-ton delivery truck, open body.

Harold L. Arnold: Seven styles Vim delivery out of fourteen in regular stock, one open delivery without top, one open delivery with top, one fire department chemical wagon, one stake body, one U. S. Mail wagon, one jitney bus with brilliant red paint, one closed delivery.

Los Angeles Trailer Co.: One 4-ton four-wheel Utility trailer chassis, one 1-ton two-wheel Utility trailer with flat body, staked, and one 800-lb. two-wheel Utility trailer with stake body.

H. G. Pendell: One Denby 2½-ton.

John A. Ewin: Warner camping trailer, one Warner trailer with stake body.

John Lee: One Commerce ¾-ton open delivery body, one Commerce ¾-ton chassis.

Pioneer Commercial Auto Co.: One White ¾-ton chassis, one White 5-ton dump truck.

Hartwell Motor Co.: One Jeffery Quad 2-ton chassis, one Jeffery 1½-ton chassis, one Jeffery ¾-ton closed delivery.

Woodward Truck Attachment Co., Los Angeles: One-ton Ford truck attachment and original four-speed transmission for Fords.

Pacific Kisselkar branch: One Kisselkar 1-ton chassis, one Federal 1½-ton chassis, one Briscoe 1000-panel body delivery.

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Olds, Banta & Smith: One M. & W. truck attachment, one Standard truck attachment.

Aston Motor Car Co.: One Pullman open delivery body.

STUDEBAKER PRICES RISE

DETROIT, Nov. 6—On Dec. 31, 1916, prices of Studebaker delivery models will go up $50 on the 1000-lb. model and $100 on the 1-tonner. This increase has been made necessary to cover the increased cost of practically all materials entering into their construction. Following are the old and new prices on all models in the two capacities:

	1916	1917
1000-lb.:		
Chassis	$785	$850
Panel	875	925
Express	850	900
Station	875	925
2000-lb.:		
Chassis	1,100	1,200
Stake	1,250	1,350
Express	1,200	1,300
Bus	1,400	1,500
With seat	1,150	1,250

SELDEN SELLERS CONFER

ROCHESTER, N. Y., Nov. 7—Division sales managers from all parts of the country in the new organization of the Selden Truck Sales Co. met here Nov. 2, 3 and 4 with Sales Director H. T. Boulden. At this meeting a new policy in selling and advertising was mapped out and launched with vigor. It was attended by Sales Director Boulden of the company, George C. Gordon, president; William C. Barry, Jr., vice-president; R. H. Salmons, secretary, and thirteen division sales managers from all sections from ocean to ocean.

WAR TRUCKS AT S. A. E. WINTER MEETING

NEW YORK CITY, Nov. 10—The technical papers to be presented at the one-day, January 11, professional session of the Winter Meeting of the Society of Automobile Engineers will be truly representative of the enlarged activities of the society. Some of the papers will, of course, relate to motor car engineering, but in addition subjects of interest to aeroplane, tractor and marine engineers will be presented. The Papers Committee, of which K. W. Zimmerschied is chairman, is making the arrangements.

A paper will probably be read on motor trucks, with reference particularly to the proposed military specifications now being considered by the Truck Standards Division of the S. A. E. Standards Committee and a specially appointed board of the War Department.

Windy City Opposes Truck Fenders

Motor Truck Owners' Assn. to Fight Them to Finish

CHICAGO, Nov. 2—Chicago motor truck owners are mobilizing their forces to combat the proposed inforcement of the truck fender ordinance. Last July when the ordinance was adopted, 6 months were given in which to test out the various fenders which local concerns were making an effort to have indorsed by the police department. Chief of Police Healy has refused to give his indorsement to the devices submitted but the concerns who have fenders to offer have gone over his head and in fact ahead of the ordinance and had an amendment passed in the city council in a effort to get their certificate of approval Nov. 1 instead of Jan. 1.

Truck owners and their organization, the Motor Truck Owners' Assn., are preparing to fight the ordinance. During the last 2 or 3 months truck owners have attempted to purchase fenders for the purpose of making tests as to their practicability, cost to keep in repair, and general operation, and the association believes that these attempts have stirred up the fender makers who want to get city endorsement prior to the original limit given. So far no one has been able to purchase fenders from any of the firms seeking certification and the Motor Truck Owners' Assn. voices the opinion that the fender makers want city indorsement in order to interest capital to manufacture.

Fenders Are Impractical

Secretary Ertsman, of the Motor Truck Owners' Assn. is emphatic in his statement that the fenders are impractical from a mechanical standpoint and also from the standpoint of increasing safety. He says the type of fender is practically the same as the ones used on street cars several years ago and which the street car companies found to be responsible for more accidents than for lives saved. He says the constant vibration in a motor truck moving over rough streets would soon put such a fender out of order and he believes that were any of these suggested fenders adopted, their saving of life would be an exception rather than the rule. Th ordinance specifies that 4½- and 10-inch clearance and Secretary Ertsman points out that the majority of drivers would keep it at the 10-inch position, in which case a person would be likely to go under rather than fall upon the fender. If a 4½-inch clearance were used, the fender would be so low that in passing over bridges, railroad crossings and other uneven places it would very likely be damaged.

Four local companies and one from Minneapolis are bidding for favor from the city council. Fundamentally, the device that each proposes to make is the same. The Truck Owners' Assn. met Nov. 1 to discuss the situation, but no action will be taken against the proposed inforcement of the ordinance until after Jan. 1, 1917.

TRUCK FIELD IN INDIA

AKRON, OHIO, Nov. 2—"India offers a big field for American trucks," reports C. C. Devore, resident representative of the Goodyear Tire & Rubber Co. at Bombay, India, who has just returned to this country. "There are now only about 500 trucks in the country," he says, "which is not a very large number when you consider the size of that great empire. The chief highways are stone-surfaced and are kept in good condition. We have been fortunate in escaping any curtailment of the importation of cars and have not been limited in our gasoline supply, although the price of gasoline is very high."

WAGON COMBINE TO MAKE TRUCKS

CINCINNATI, OHIO, Nov. 1—Steps have been taken by almost a score of wagon manufacturers of the Queen City for the merging of their interests into a large concern for the manufacture of both horse-drawn and motor-driven wagons, to be used for all purposes. A preliminary meeting was held Oct. 28, when the project was discussed and Attorney Emil Hauch was instructed to draw up the articles of incorporation for a $500,000 concern.

It is planned to erect a large central plant and use a number of the existing plants as branches. Some of the present plants will be abandoned entirely. Among those interested in the movement are Fred Dhonau, Jr., president of the F. Dhonau Son's Co.; L. J. Froelicher, of A. Froelicher Sons Co.; Michael Klopp, of Phillip Klopp & Sons; George Finn, of the J. Finn Sons Co.; J. H. Lewis, H. Burdorf and Harry W. Monning, individual manufacturers.

REPUBLIC AGENT TO BUILD TRUCKS

CHICAGO, Nov. 13—*Special telegram to* THE COMMERCIAL VEHICLE — Eugene Goldman, dealer for Republic trucks in Chicago and said to be the largest dealer on the Republic staff, is severing his connection with the Republic company. It is stated that he has organized his own company to build complete trucks. No details as to the product are yet available, but these will be announced later. It could not be learned what arrangements will be made by the Republic company. The success of this dealer in Chicago has been marked and a large number of Republic trucks have been placed in the service of Chicago merchants and manufacturers.

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Motor Truck Insurance a Business Proposition

Classes of Motor Truck Hazards and Corresponding Coverages, Differences in Policies and Classes of Companies

By Harold A. Sonn

GOOD business men do not need to be told the importance of insuring their trucks, but many do not understand the essentials of good insurance buying or realize the wisdom of securing as full coverage as possible. To purchase such protection intelligently all owners should consider first the class of hazards open to liability due to the operation of the trucks; secondly, the insurance policy embodying such liabilities; thirdly, the company issuing that policy, and, finally, the premium rates for same.

Liability Greatest Hazard

The greatest hazard of all is that of liability for injuries to the public. Why run the risk of having to pay heavy damages for personal injuries accidentally caused by your truck? Your driver may be extremely cautious, your truck in excellent condition, but you cannot always control the situation. Did you ever notice a chicken start across the road, then turn or recross the road directly in front of your machine? Pedestrians are equally as careless and are apt to become confused. It matters little where the fault lies, responsibility is always put to the owner or user of the vehicles.

Liability insurance insures full protection against this hazard. It should protect you against claims for damages whether your legal liability is proven or not. It not only guards you against money loss, but relieves you of possible inconvenience and anxiety. Each accident is promptly investigated, if the assured is liable, settlement is made, if possible, without litigation. If action is brought the company defends it, defraying the expenses of litigation and paying damages awarded up to the limits of the policy.

Liability Policies

All liability policies cover claims for damages as follows, unless additional amounts are desired and the increased rates paid for accordingly: $5,000 in case of loss or expense arising or resulting from claims upon the assured in an accident involving one person; $10,000 if the accident involves more than one person, $5,000 being the limit for each individual.

These claims besides arising from injuries inflicted by the operation of the vehicle may come through the loading and unloading of the goods on and off the trucks.

Property Damage

Property damage is another risk you run. You may destroy or injure property belonging to others. Such accidents are as likely to occur as those involving personal injuries. The possibilities range from the collision with another vehicle to the breaking of a fence or garage door. Milady of fashion passing by may have her gown spattered with mud, a sufficient basis for claim. This class of insurance protects one against such claims on account of injury to or destruction to property of others, except such as is carried on the truck. The usual limit in amount for this coverage is $1,000, which may be increased as the assured desires for a small additional premium.

Collision

Now that we have discussed the types of insurance involving claims made upon the assured by the public, let us turn to losses involving the assured directly. How about damage to your truck? This is called collision insurance. Isn't the blowing out of a tire or the breaking of a part liable to turn the truck out of its path and precipitate a disastrous collision, and who will pay the repair bill? Can you control the other man's machine from smashing into yours, and if you do not carry collision insurance, have the trouble of trying to collect from him? Perhaps the fault may lie with you both. Then, again, there is the delay of such action. Your time is valuable and the truck should be repaired immediately. Do not neglect to insure yourself. There are two forms of collision coverages known as deductible collision and full coverage collision.

From the former, on account of a lower rate granted, the assured agrees to stand the first $25 of each claim. No claims under $25 being paid by the company, the company having the privilege of deducting $25 from every loss amounting to over this amount, namely, on a $40 claim $15 is awarded.

Full coverage collision pays all claims irrespective of amount and the rates are based upon the original cost of the truck when new. The charge for this extra coverage is $35 additional premium.

All owners realize the necessity of insuring their vehicles against fire. Many also appreciate the additional protection of a fire policy that covers loss or damage to their trucks through transportation perils, lightning, explosion, water damage, cyclones and tornadoes. A complete fire policy generally includes all of the above hazards. A special discount is allowed for trucks equipped with approved hand fire extinguishers. If the total amount of value of the trucks exceeds $15,000 the insurance company can apply to the exchange for a specific rate upon same, which, in the majority of cases, is very much lower than the individual rate for each machine.

Theft

Have you ever had lamps or spare tires stolen from your machine when it was standing in the street? If you haven't yet, others have, and there is no reason why you should always be exempt. Thieves are daily appropriating entire vehicles. Theft insurance usually goes hand in hand with fire insurance, both in the same policy. If the assured is willing, as in collision insurance, to stand the first $25 of each claim, there is no additional charge for same. If full protection against theft, irrespective of the amount, is desired, an additional premium of $15 is charged.

Fire

There are two forms of fire insurance policy, valued and non-valued. Under the valued form the company agrees to make repairs at the value placed upon the car at the time the policy is issued. Any losses are reinstated without extra charge when repairs have been completed, and under this form of policy theft insurance is included. Under the non-valued form losses are adjusted less the depreciation, due to the wear and tear upon the machine, excluding the automatic reinstatement clause and voiding the theft coverage. There is also a non-valued form issued, including the theft feature.

The Policy

There is a standard form of policy issued by nearly all companies, but often endorsements alter or correct certain

(*Continued on page* 29)

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Twin Services Enable Hartford Trucks to Keep at Work Continuously

Demands of Coal and Building Material Business Combine to Supply Constant Employment for Two Old Trucks

EXPERIENCE has demonstrated that if a commercial vehicle is kept constantly on the move it will return a profit. Curtiss & Dean, a Hartford, Conn., engineering firm, believes in keeping trucks constantly on the go. When they are not using their two Lauth-Juergens 2-ton trucks in their own service they are rented out to someone else and make a profit well above expenses, as, for example, in hauling steam coal, at which one of them was kept very busy last winter.

Curtiss & Dean design and build all kinds of houses and do considerable concrete work, and for this reason the pair of trucks is very useful. Sometimes these trucks are hauling tile used for fireproofing, or brick, sand, cement, lime, hair or crushed stone, and, again, cinders used in fireproofing. Tile is drawn from the freight yards in the rear of the firm's garage on Hoadley Place; cement from the basement of the garage, which is used as a warehouse; stone from the quarries, and sand from the river pits. It is to be noted that the loads carried are very solid.

$10 a Day

The daily cost of each of these vehicles is given by J. W. Morrison, secretary of the firm, as $10.17, and just how these figures are arrived at is obvious from the following tabulation:

License fee	$0.30
Garage	.30
Insurance	1.00
Depreciation	3.00
Driver	3.00
Gasoline	1.92
Oil	.40
Tires (2½ cents a mile)	.25
	$10.17

Depreciation is figured at 25 per cent, and already 2 years have been charged off. Asked about depreciation Mr. Morrison said: "If repairs equal depreciation at the end of 4 years, throw the truck away."

"Horse equipment to do the work done by one of these two trucks would cost $20," Mr. Morrison said. "An advantage of the truck which cannot be figured in dollars and cents is that it is ready when wanted. A team ordered for 7 o'clock in the morning may not show up until 9 o'clock. With the truck we know where our men are all the time."

220 Days a Year

The line of work followed by Curtiss & Dean is to a great extent dependent upon the weather. Obviously zero weather is not good for concrete laying. Cold weather is the slack season for the firm, and this spell is made use of to overhaul the vehicles. One of the truck-drivers is a good mechanic, and he and one of the helpers do most of the work.



Dumping a load of sand weighing over 4 tons at the scene of a building operation

The Curtiss & Dean trucks are operated but 220 days in the year, according to Secretary Morrison, or 70½ per cent of the possible working period. The figures given are, of course, based on the 220-day session. As the firm has its own garage, repairing is simplified. Outside vehicles stored here also support part of the overhead.

The firm has a unique way of caring for chains, both trucks, by the way, being chain-driven. Four sets are carried, which means there are two spare sets. Each set is used for a week and removed for a week's rest and deposited in a barrel of graphite grease and oil. Obviously they are well lubricated and always in good working order. There are spare parts on hand, for the firm at one time represented the make of truck used. There has never been any chain trouble in this service.

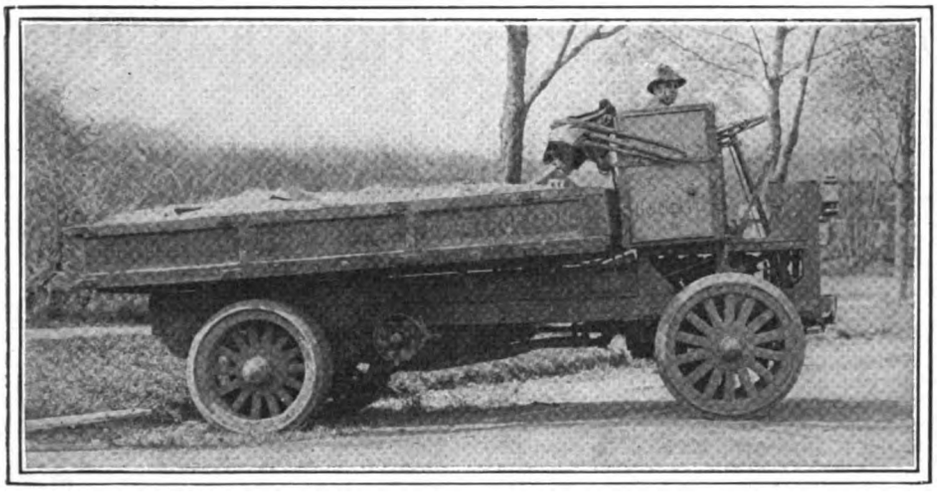
Rolling Dump Bodies

The Curtiss & Dean 2-ton trucks are fitted with rolling dump bodies of the firm's own design and construction. Over the chassis proper there is a platform on which there are two grooves running the length of the frame. In these grooves operate eight steel rollers attached to the dump body, four rollers on each side. At the front end of the body is a hook latch. When it is desired to discharge the load this latch is unfastened and the driver starts his truck. The tendency is for the chassis to move away from the body, which is centered on it, and the slightest movement throws off the balance and causes the body to roll to the rear. There are stops at the ends of the grooves to retain the body. One man with a crowbar can easily care for the unloading. The idea has worked out very well, and meets all the firm's conditions. The body and platform weigh 1 ton.

Character of Loads

Interest centers in the character of loads. Stone is a big item. This is drawn from the Balfe quarries at Newington, 5½ miles from the Curtiss & Dean garage, to houses in course of construction throughout the city. The heaviest day's haul was 80 tons of stone. About ten trips are made in a day when there is a big demand for stone on some particular piece of work. Stone is also

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This load of sand weighs 4 tons. It has just been hauled 4 miles from the river pits

drawn from State street bins in the city, ⅜ mile from the garage. The stone is loaded by gravity.

Sand is loaded at the river pits, nearly a mile from the garage, to various points, West Hartford being 3½ miles from the river, and from this point to the northern city limit is 3 miles, south 2½ miles. There is no east, since the river is the eastern boundary. Hartford extends west from the river. When sand is taken on two men load it by hand.

Cinders are hauled for fireproofing. Tile of the fireproofing variety is another item. This is usually loaded from the freight yard in the rear of the firm's garage. The haul in mind was from the freight yard to the new Palace Theater building, a distance of ½ mile. The driver received the tile and piled it in the body while two men within the truck picked it up and handed it to him. Three thousand eight hundred tile were hauled in one day, the tile being 12 in. square. Secretary Morrison says it would cost $18 for horse teams to carry the same load and would require a day and a half, so that $8 and a half-day's time were saved by the truck. He said: "The trucks will do the work in 1 day, and unless we are with the teams they will take 2 days; in other words, we have to keep close watch on the teams."

Hauling Coal

Last winter there was a big demand for extra trucks to haul coal of the steam variety on short hauls. One of the Curtiss & Dean cars was used for this special service and rented out for a sum sufficient to return a good dividend above the actual overhead and operating costs. In coal service the low-sided body is fitted with large boards, which permits of a higher load.

It is to be noted that the Curtiss & Dean trucks are habitually overloaded. In

(*Continued on page* 23)

CURTISS & DEAN — MONTHLY MOTOR TRUCK EXPENSE STATEMENT — 252 Asylum St., Hartford, Conn.

No. of Truck ____ Driver ____ Month ____

Fixed Charges	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total	Daily Avge.
Amortization at rate of %																																	
Interest at rate of %																																	
Insurance, Full automobile																																	
Garage																																	
License																																	
Total Daily Fixed Charges																																	
Operating Costs																																	
Gasolene (gals. at cts.)																																	
Lubricants																																	
Wages, regular																																	
Wages, overtime																																	
Tires																																	
Repairs, chassis																																	
Repairs, body																																	
Miscellaneous Expense																																	
Total Daily Operating Cost																																	
FULL TOTAL DAILY COST																																	
Distribution and Statistical																																	
Parts replacements																																	
Periodical overhaul																																	
Garage, realty overhead																																	
Garage, washing car																																	
Accident repairs																																	
Repairs to accessories																																	
Repairs on road																																	
In Work (mark W)																																	
In Shop (mark S)																																	
In Reserve (mark R)																																	
Tire Repairs																																	
Tire Adjustment (new tires)																																	
Daily Mileage																																	
Daily Units delivered																																	
Daily Tonnage delivered																																	
Daily Gasolene mileage																																	

Curtiss & Dean DAILY TRUCKING SHEET

TRUCK NO. ____ DRIVER ____ DATE ____ SHEET NO. ____

MATERIAL | FROM | DELIVERED TO | ARRIVED | LEFT | MISCELLANEOUS

GAS
CYL. OIL
GREASE
FERRIAGE
WEATHER
ROAD REPAIRS
ROAD CONDITIONS
TOTAL MILEAGE

Original cost-accounting forms employed by Curtiss & Dean, by which most of the items of cost are kept besides some performance data

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Every Known Type of Body Is Built For The Commercialized Ford

Made as Complete Superstructures or Boxes For Runabout Rear Decks—Nineteen Manufacturers

STOCK models of bodies for Ford delivery vehicles can now be had for almost every ordinary business purpose. While Ford vehicles are not designed for the continuous operating conditions under which commercial vehicles have to work, yet such a large number of them is engaged in delivery work that there has been a large demand for bodies especially adapted for their use. This demand has been answered by the establishment of a small industry in itself whose sole purpose is the manufacture of such bodies on more or less of a large production basis.

Stock Ford bodies can now be had for the grocer, butcher, department store, florist, farmer, bus operator, traveling salesman and even the undertaker.

These bodies may be divided into two classes, those which are fitted on the stripped chassis and those which are mounted on the rear deck of roadster models. The various models in the former classification consist of panel, screen-sided express, open express and bus or station-body types.

Metal or Wood Construction

Some of the panel models are made up of sheet steel units and others of the more conventional wood members. The panel types are further differentiated by swinging tail-gates with roll curtains at the top, solid backs or full-height swinging doors. Some of this type are also furnished with cab doors, permanent inclosed cab housings with built-in windshields or with combination front and side cab curtains. For those who wish neither the inclosed cab or curtains, dash fillers are provided for use on Ford 1915-1916 chassis which have cowl dashes with builtin windshields. The cowl dash of the two models mentioned makes it imperative to use the filler and a 1914 Ford windshield if closed cabs are not included with the delivery body purchased.

Many of the panel models are also furnished with one or more removable shelves which enable loads composed of small packages, etc., to be divided for ease in picking out the packages at the points of delivery without undue handling of the remainder of the load. Some of the panel bodies are also fitted with dome lights at an extra charge. These are a great convenience to the driver or helper of a department store vehicle in readily finding the packages to be delivered when the length of the route covered is such that considerable night driving must be done.

Some of the panel models are also provided with single drivers' seats with fold-down backs to enable the goods in the bodies to be reached easily. Others have conventional seats across the full width of the body.

Some of the open express types have ordinary solid top flareboards, while others have demountable slat tops or metal rails. The tops fitted on the express type models are offered in four- or six-post types.

The station-body models offered by some of the makers are in reality modified express types with tops. Some of these are designed to employ one or more removable crosswise seats while others are fitted with longitudinal seats hinged to the top of the flareboards on each side. When not in use, these seats may be swung up out of the way and held in a vertical position by means of removable back-rests held in U-shaped brackets on the top posts. When the seats are thus swung up, the clear area of the body floor is available for the haulage of trunks, baggage, etc., or for other goods according to the business of the owner.

Some of these station types are also fitted with side doors in the low panel sides to permit of easy entrance to the seats when these are of the crosswise type. Many makers also offer full-curved rear fenders to replace those fitted on the chassis as purchased.

Some of the bus bodies are furnished with rear entrance doors and others with doors at the front, so that the driver may act both as the driver and conductor or fare collector without leaving his seat. Some of these types are fitted with regulation drop-sash windows and others with conventional tops with side and end curtains for use in inclement weather.

One or more of the Ford body builders offer undertakers' types. These are known as the first-call or casket model and the hearse type. The former is used to transport the casket, embalming fluid, chairs and other paraphernalia to the home of the deceased. These are substantially panel bodies with slightly more ornamentation than those used for ordinary commercial purposes. If desired, this type of body can also be had with inclosed front end and plate glass windows. The hearse types are generally used on Ford chassis with elongated wheelbases to provide sufficient length for caskets as long as 7 ft. 3 in. These are much more elaborate than the first-call type and are provided with plate glass side windows backed by drapings and removable casket tables complete with rollers and adjusting pins to keep the casket from sliding while the vehicle is in motion.

MAKERS OF COMMERCIAL BODIES FOR FORD DELIVERY VEHICLES

Auto Remodeling Co., Chicago.
Babcock Co., Watertown, N. Y.
Barnett Auto Body Co., San Francisco, Cal.
Champion Wagon Co., Owego, N. Y.
Columbia Wagon Co., Columbia, Pa.
Commercial Auto Body Co., St. Louis, Mo.
Eberhard Mfg. Co., Cleveland, Ohio.
Henney Buggy Co., Freeport, Ill.
Highland Body Mfg. Co., Cincinnati, Ohio.
Hoover Wagon Co., York, Pa.
Kratzer Carriage Co., Des Moines, Iowa.
Martin Carriage Works, York, Pa.
Meyer Wagon Works, Buffalo, N. Y.
Mifflinburg Buggy Co., Mifflinburg, Pa.
Murphy, P. J., Minneapolis, Minn.
Ohio Welding & Mfg. Co., Cincinnati, Ohio.
Springfield Commercial Body Co., Springfield, Mass.
Texas Wagon Works, Houston, Tex.
Wadsworth Mfg. Co., Detroit.

Open or Closed Box Forms

The bodies fitted on the rear deck of Ford roadster models may be divided into two main classes. These are the open express and the box types. The former are very much the same as those fitted on the conventional chassis, except that they are shorter in length. They are offered with integral flareboards or those of the removable slat type. Some are also provided with four-post tops with side and end curtains. These tops are not as high as those fitted on the express bodies on chassis, but extend to the bottom of the rear window in the roadster top.

The box types are offered in several different styles, some with doors at the top and others with double or single doors at the rear. Some are also provided with shelves to carry various articles and samples such as are used by traveling salesmen. These bodies are generally demountable by dropping out four or six bolts, after which the Ford may be used as a purely passenger vehicle. They are also made of wood or sheet steel, according to the maker. One concern also offers a panel body to be attached to a roadster model.

Some makers ship all types of their bodies set up and ready for attachment, while others prefer to ship in the knocked-down form to reduce freight charges. In the latter case, the bodies are usually set up in the factory and then taken down and crated for shipment. The setting-up process insures the purchaser receiving a body which can be re-assembled easily and without the necessity of any slight alterations of the various parts to make them fit perfectly.

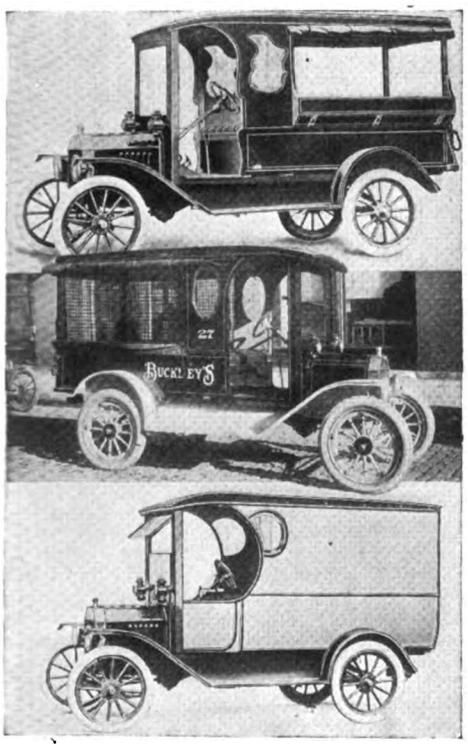
The makers of Ford bodies, their addresses and short descriptions of their products are as follows:

Babcock

H. H. Babcock Co., Watertown, N. Y.

Unit construction is the outstanding characteristic of Babcock bodies which are offered in nine different models, five of the

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Three types of Commercial bodies, showing built-in windshields in all three and fore door in lower model. The latter has sheet steel side panels

panel type and four of the express type, with or without top or screened sides. All are designed for attachment to the chassis and all except one are built from a common body base of a low-sided flareboard type. Unit steel side panels are fitted to the open express type with top to form all except one of the panel types. One of these has windows at the end of the driver's seat and the other has not. Both of these models may be fitted with either roll-curtain rear ends or double doors. The open express type with top is made by adding a unit top to the open type and the screen-sided type by adding unit side screens to the express type with top. The one panel type which is not formed by the addition of the steel unit panels is a wood model with straight sides. All models are shipped in their knocked-down forms.

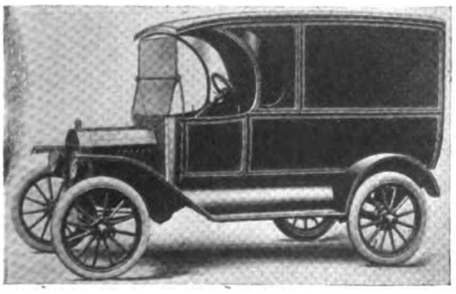
Barnett

Barnett Auto Body Co., San Francisco, Cal.

No less than thirty different styles of Ford bodies are offered by the Barnett concern which maintains distributing stations in St. Louis, Mo., Evansville, Ind., Tucson, Ariz., and Los Angeles, Fresno and San Jose, Cal. The models manufactured include several types of panel bodies with metal sides and single or double rear doors open or closed cabs, blind fore doors and several forms of front-end design with or without side windows at the ends of the drivers' seats.

Express types with or without tops and screened sides are also offered. One combination hotel bus and baggage body made with hinged longitudinal two-part seats is also manufactured. In addition, the concern makes a station body with one or two removable seats placed aft of the driver's seat, thus giving a seating capacity of six.

The roadster bodies include two lengths of the box type with rear doors; two lengths of open express models and two lengths of the same type with low tops and side curtains. All of the Barnett bodies are shipped in knock-down form.



One of the ten Columbia panel types. It has swelled sides and fore doors

Champion

Champion Wagon Co., Inc., Owego, N. Y.

Champion bodies are offered in eleven models. Four of these are of the panel type; one open express; three express models with tops with open, screened or curtain sides; two bus types, one with front entrance and the other with rear, and one open flareboard type for attachment on the after decks of roadster models. The characteristic body of the line is a panel type with light Pantasote sides, the remaining panel models having steel panels. Aside from the panel material, the closed types vary according to whether they have no windows at the ends of the drivers' seats, stationary windows or those with drop sashes. The express types, both with and without tops, and the flareboard type for roadster models, follow conventional



One of the Babcock unit bodies with steel panels, rear doors and left fore door

design. The Champion company also makes a wide range of bodies adapted for use on converted Ford chassis made over by any of the attachments described in the August 15 and September 1, 1916, issues of THE COMMERCIAL VEHICLE.

Columbia

Columbia Wagon Co., Columbia, Pa.

Offered by a concern which has manufactured wagon bodies for 26 years, Columbia bodies for Ford chassis are made in a complete line of ten panel types; two open express models; two express designs with tops and three types of bus bodies. The Columbia company also manufactures a stock line of bodies for heavy motor trucks, for the Vim 1,000-pounder and for Saxon chassis. All are made of wood.

The Ford panel types vary according to the design of the front end and windows; the curve of the top; the use of fore doors and rear end doors; the side panel material, one model having curtains tacked taut, and the use of ordinary, built-in or curtain cabs.

The open express models are furnished with either iron or slatted flareboards. The covered express types are substantially the same except for the tops which are fitted with roll curtains.



A Champion panel delivery with steel side panels. The windows at the ends of the drivers' seats have drop-sash frames

Two of the bus models offered are of the rear-entrance type, one having drop-sash windows and the other being open-sided with roll curtains. The third bus type is of the open-sided type with front instead of rear entrance. All three models each have a seating capacity of eight besides the driver.

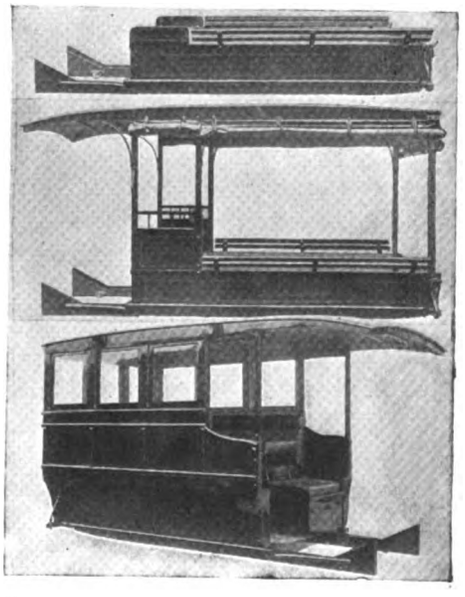
The bus bodies are always shipped set-up and ready to place on the chassis. The other types can be shipped in the same manner or in a knocked-down form if the purchasers have facilities for assembling them. The Columbia company does not offer any models suitable for attachment to Ford roadsters.

Commercial

Commercial Auto Body Co., St. Louis, Mo.

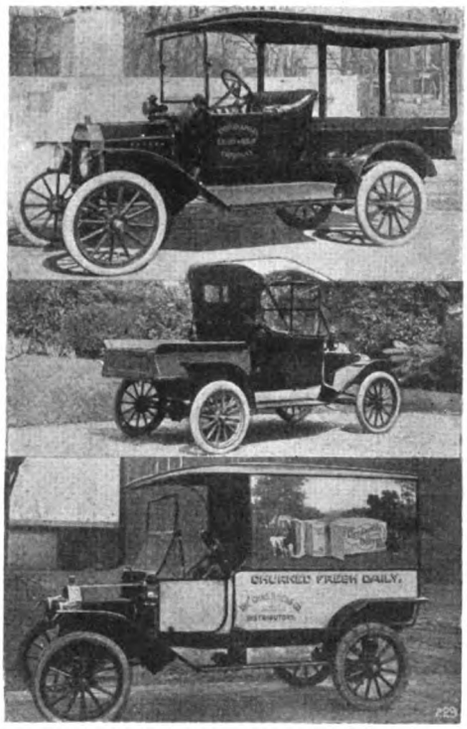
Commercial bodies are offered in two distinct classes, one the Superior and the other the Quality grade, the former being slightly higher in price due to the use of plate glass instead of the ordinary kind and a greater attention to ornamental details. A wide range of styles is offered in each class. In the Quality grade there are two panel types; one open express; two express models with tops; a double cross-seated bus type and two types adapted to roadsters. One of the latter models is a flareboard type and the other a steel box type with double rear doors. The panels of the closed types are made of sheet steel. The express types are made of wood.

The most popular styles of the Superior grade consist of three panel types all with steel side panels; one cab-type open express without a top and an open express



Three of the eleven Champion models, an open express, express with top and a front-entrance bus type. The latter is furnished with drop-sash window and seats from six to eight passengers

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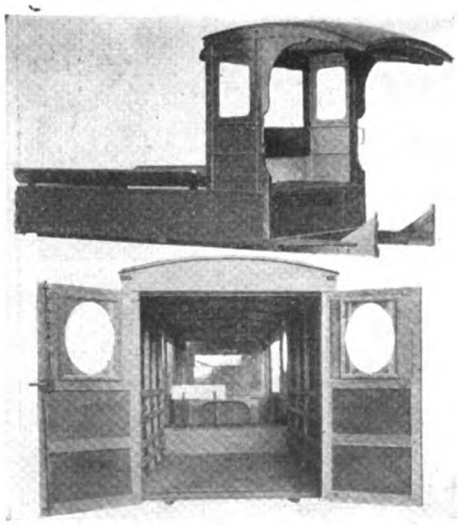
Three Highland models, that at the top being an express type with top fitted on a roadster model. That in the middle may be easily removed if desired to enable the vehicle to become a purely passenger one. The bottom view shows to what good effect the panel sides may be utilized for advertising purposes

model with top and detachable flareboards. All commercial bodies are shipped in knocked-down form to reduce freight charges.

Eberhard Body Irons

Eberhard Mfg. Co., Cleveland, Ohio.

Malleable irons for Ford and other types of bodies are the exclusive product of the Eberhard company. These irons can be used for full panelled bodies, with straight or curved sides, express types and even for Ford roadster bodies. The various irons include corner and side braces; top angles; door hinges and locks; footboard lever and pedal plates; seat braces and hinged backs; front arch stays for joining the lower front edge of the side panel to the vertical stanchion carrying the cab door, and body and chassis connections. The various irons are shown clearly in the semi-phantom view at the top of page 23.



Two Martin bodies, a cab-front open express type at the top and a rear view of one of the steel-sided panel models at the bottom. Note the inclosed cab in the latter and the construction of the side studding

Henney

Henney Buggy Co., Freeport, Ill.

Seven models are offered by the Henney company. These consist of two distinct panel types with sheet steel sides; an express type with a permanent top; a flareboard open express type which can be fitted with a stock top and one crosswise seat in addition to that for the driver; a general utility type with top and demountable longitudinal seats which are hinged to be swung up out of the way when not in use, and two types for Ford roadsters, one an open flareboard model and the other a steel box with double rear doors.

Hoover

Hoover Wagon Co., York, Pa.

Fifteen various designs of bodies adapted to Ford chassis are made by the Hoover company. Five of these are of the panel type; three open express models; one station body; two bus designs; two express types with tops and two undertakers' models.

The panel types can be furnished with either wood or sheet steel sides with one exception, this being equipped with fiber panels. Aside from the panel material, the types vary according to the front end design and whether cab doors or built-in cabs are supplied. Rear doors or open rear ends with tail-gates and roll curtains are optional. Standard sizes of parcel racks are furnished when specified.

The open express types are of the conventional flareboard type except that one is fitted with a permanent cab top and side curtains. The express types with full tops can be had with open or screened sides.

The station-body type is designed with low side doors and a removable crosswise seat. This model may also be fitted with low side screens for delivery purposes.

The two bus models are both of the front-entrance type, one with removable window frames and the other with drop-sash windows.

One of the undertakers' models is a first-call body, similar to the panel type except for a trifle more exterior ornamentation. The second is a hearse type with a removable floor with casket rollers and holding pins.

All except the fiber-sided panel body, the two undertakers' models, the screen-sided express model and one of the open express, can be shipped in knocked down.

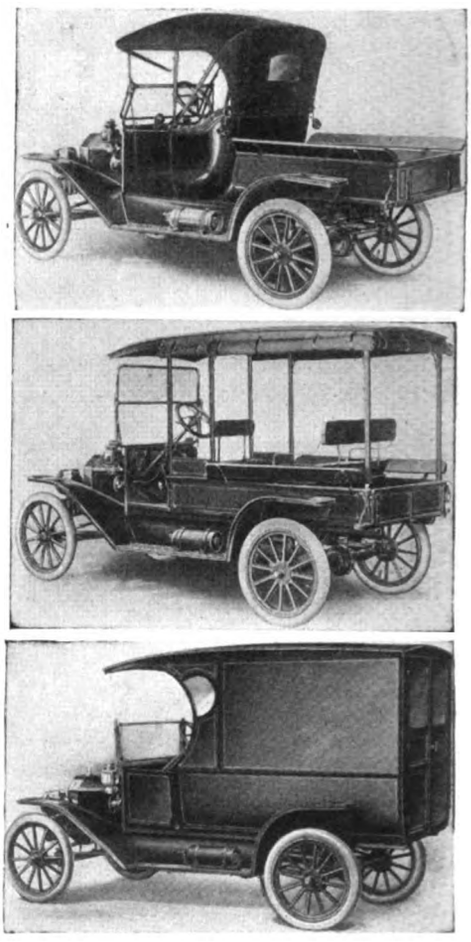
Highland

Highland Body Mfg. Co., Cincinnati, Ohio

Built by a concern which previously manufactured only motor truck bodies, the Highland Ford delivery bodies are offered in twelve types. Six are for Ford chassis and six for roadster models.

The chassis types consist of three panel units, two of which differ in the design of the front end and the third in that it has an inclosed cab with built-in windshield. The two former types are each offered in two lengths. All three models may each be had with end-gate and curtain or end-gate, screen and curtain instead of doors. They may also be supplied with shelves and slides located as desired and the front ends back of the drivers' seats closed by means of a roll-up wood curtain.

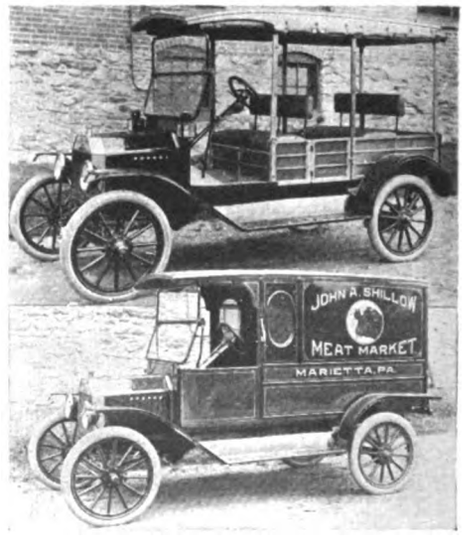
The open express types are of the conventional design as do also the express types with tops, one of which may be had with



Three of the Henney types. The open flareboard type at the top is demountable. Note the removable crosswise seat in the center view which converts an ordinary express type into a station body. The panel body at the bottom has steel sides

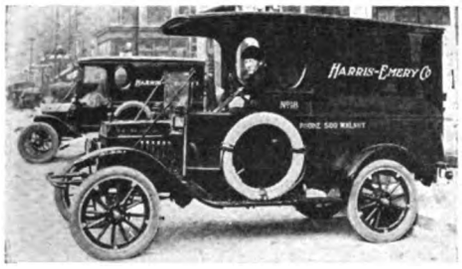
screened sides. Extra crosswise seats are also kept in stock for the express type models.

The roadster types include a panel model; a flareboard type with no top, top with open sides or top with screened sides, and two removable units, one a flareboard design and the other a box type.



Two of the fifteen Hoover models. That at the top is a convertible station bus or ordinary delivery vehicle. It has a second removable crosswise seat which is reached by a small side door. That at the bottom is a wood panel type

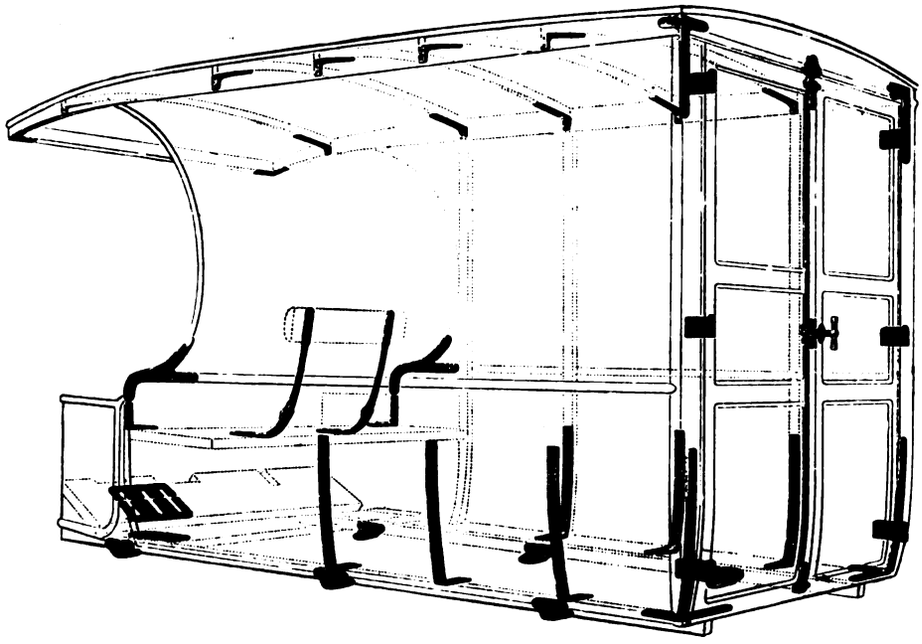
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A Kratzer full panel body with under-cut wheel housings and fore doors



One of the Mifflinburg wood panel types full-curved rear fenders and fold-out windshield



Phantom body view showing various forms of malleable irons which may be used in Ford wood body construction

All Highland Ford bodies are of wood and all are shipped in their finished form, not knocked down.

Kratzer

Kratzer Carriage Co., Des Moines, Iowa

Manufactured by an old carriage-making concern, the most popular-selling Kratzer model is a panel type with cab doors. It has windows at the ends of the driver's seat and is undercut for the rear wheels which have full rounded fenders made by the Kratzer company.

Martin

Martin Carriage Works, York, Pa.

Consisting of thirty-nine models in all, the Martin line is made up of two distinct classes, one of wood and the other of steel. In all there are twenty types of panel designs, fourteen of wood and six of steel. Six models of express bodies with tops are offered and three of the open express type, all of wood. Five types of bus bodies are made; one ambulance and one hearse.

Three models for Ford roadsters are offered. One is an open box type with rectangular-sectioned slatted flareboards and the second with rods in place of flareboards. The third unit is a steel closed box type.

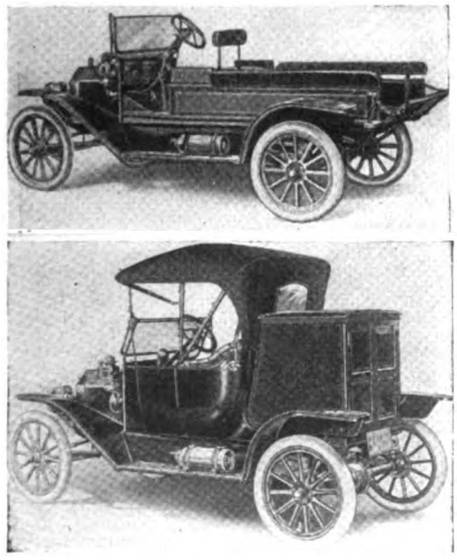
A great variety of taste is offered in the twenty models of panel bodies made. In the steel types, the various models differ in the shape of the windows at the sides of the drivers' seats and whether they are open at the front, fitted with fore-doors or inclosed cabs with built-in windshields. The wood panel types differ in the same respects but also as to whether they have swelled or straight sides.

The express bodies with tops differ in that some have eight-post tops and others six; that some have solid flareboards, others with slatted types and still others with rods. One can be had with window panels at each end of the driver's seat and with a built-in windshield. All are equipped with roll side and end curtains. The open express types also differ as to the kind of flareboards used and one is fitted with a permanent cab with windows at the sides.

The five bus bodies are each of a different type. One is practically a station body with hinged longitudinal seats and rear entrance. One other has permanent longitudinal seats with a side-entrance door just forward of the rear wheel on the curb side of the vehicle. Two others are of the open-sided types, one with a rear entrance and the other with front entrance. The fifth is fitted with drop-sash windows and an entrance and exit step at the rear.

The ambulance body differs from the ordinary panel type in that it has elliptical side windows at the side of the driver's seat and square ones on the sides at the extreme rear. It is also lined inside on the lower section and is provided with fore doors and built-in windshield on order.

The hearse body is ornamented with fluted pillars on the sides and is equipped with a coupé-effect closed cab. The left of the driver's seat is stationary and the right removable to allow the casket to extend to the front. A box is supplied under the body at the rear for carrying the removed portion of the seat. The floor is equipped with casket rollers and pins and a floral rack in two sections is provided.



The Fenney open express type at the top and the steel box type suitable for salesmen shown as fitted on the rear deck of a roadster at the bottom

Meyer

Meyer Wagon Works, Buffalo, N. Y.

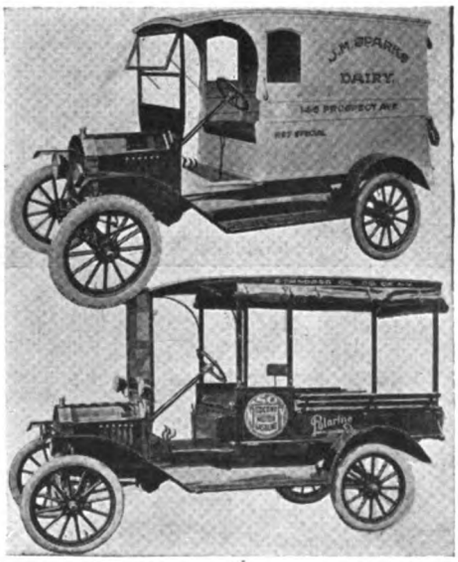
Six stock models of Ford delivery bodies are made by the Meyer company in addition to its other stock designs for heavier motor trucks. Four of the Ford styles are of the panel type, three for the chassis and one for attachment to the roadster model. In addition one express design with top is made for chassis and an open flareboard type for roadsters.

The panel models differ in their front-end design, two having side windows and the other two none.

Mifflinburg

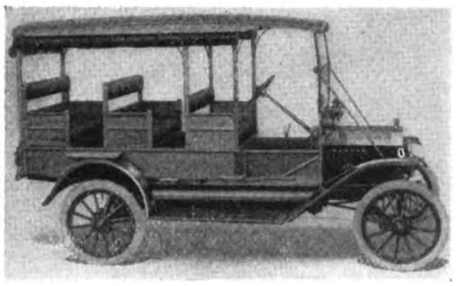
Mifflinburg Buggy Co., Mifflinburg, Pa.

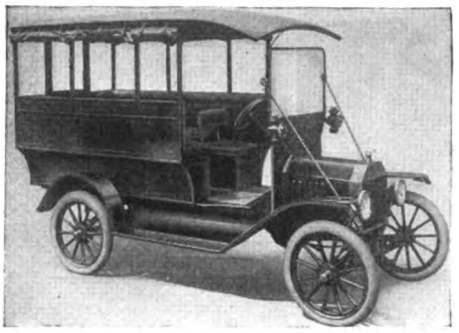
Comprising the Mifflinburg line are thirteen models, eight of the panel type; one each of the open express and express with top designs; one florist's or undertaker's model and two demountable types, one open flareboard and one box unit.



Meyer express type with top and side curtains and bottom and a wood panel type at the top. Note the type of fold-out windshield fitted on the latter

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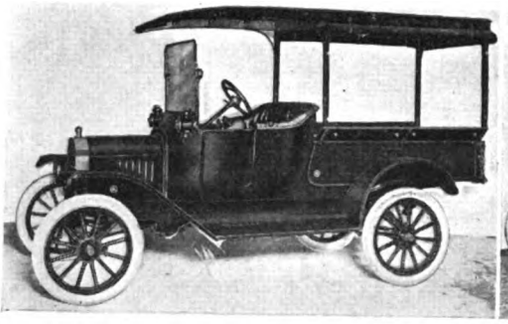




Three Springfield types. At the top, a natural-wood finished station type with three crosswise seats including that for the driver. In the center is an eight-passenger, front-entrance bus model. At the bottom, a panel type with drop-sash windows in the way of the driver's seat

The open express type has solid flareboards. The type with top is built on substantially the same base. One of the panel types is fitted with fore doors; one has a closed cab and one has curtain side panels.

The undertaker's or florist's type is fitted with a closed cab like that of a coupé. It has a two-part front seat, one portion of which can be removed to accommodate the front of the casket if the body is used by an undertaker. It also has the usual casket floor which can be removed if the vehicle is to be used by a florist and replaced by one or more shelves for cut and potted flowers.





Two Texas models, that at the left being an express type mounted on roadster. At the right, a steel panel type with distinctive cowl-fronted cab for attachment to 1915 and 1916 Ford chassis without change

Ohio Tank Body

Ohio Welding & Mfg. Co., Cincinnati, Ohio

Specializing on oil and gasoline tanks, the Ohio Welding company offers three models of quickly-detachable tanks adapted for use on the rear decks of Ford roadsters. Each may be had in either round or oval shapes.

One model is a one compartment tank of 100 gal. capacity with a can box at the rear. The second is also a one compartment tank of 140 to 150 gal. capacity but without a can box. The third is like the second except that it has two compartments instead of one. In each case the tanks are of steel, welded at the joints. Each is mounted on cradles with bands, piping, faucets and vents ready to be mounted on the rear deck of the vehicle in a few minutes' time.

Remo

Auto Remodeling Co., Chicago

Five Remo models are offered, the feature of the line being a panel body to be attached to the roadster model. This gives the appearance of a regulation panel body but one which can be detached in a short time to enable the vehicle to be used as a passenger car. The other four models consist of a panel and express body with top for attachment to chassis and open express and box type bodies for attachment to the rear deck of roadster models. All five types are made of wood parts suitably braced.

Springfield

Springfield Commercial Body Co., Springfield, Mass.

Springfield Ford delivery bodies are made in twenty-three models, all except one of which are wood. Seven panel types are offered; four express designs with tops; four bus units and four types for use on the rear decks of roadsters. In addition to these there is one each of the following types: Ambulance, hearse, station model and open express.

The panel types vary slightly in their exterior lines, the use of fore doors and the degree of ornamentation. One type is designed particularly for department stores and another for laundrymen and bottlers.

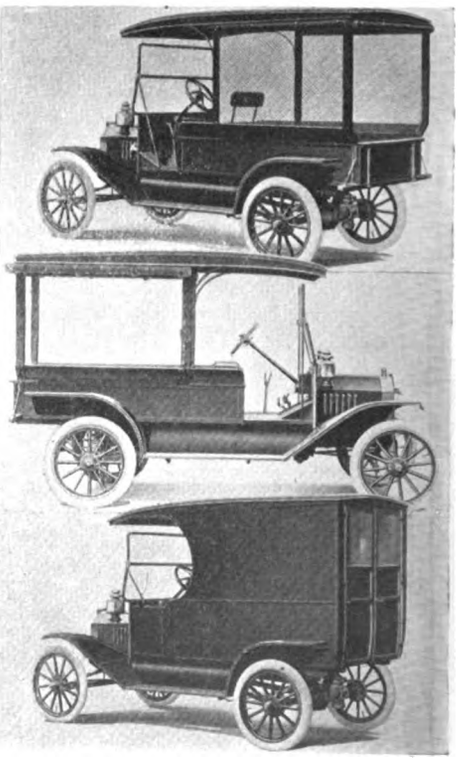
The station model is a distinctive model of the line, being finished in natural wood and provided with two crosswise seats besides that of the driver, all covered by a permanent six-post top with curtains.

The hearse and ambulance models follow conventional design, as do also the open express and express with top types.

(*Continued on next page*)



Three sizes of Ohio tanks for Ford delivery vehicles. That at the extreme left is a two-compartment tank of 140 to 150 gallons capacity. That in the center is a 100-gallon tank with can box in front. At the right is a 140 to 150 gallon tank in one compartment. All three tanks are mounted on cradles and side stringers ready for attachment on the rear ends of roadster models



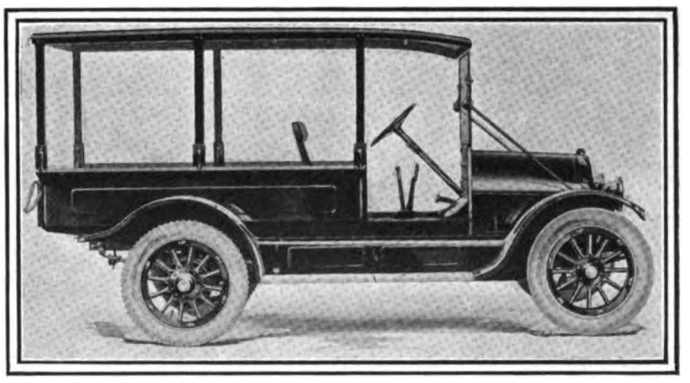
Three Wadsworth models. The two upper types are built on the same body base, the only difference being that the top one has side screens and the center one open sides. One of the four-panel models is shown at the bottom. It is fitted with rear doors and fore doors

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Overland 1200-pounder, New Commercial Chassis

All-Steel Construction and Electric Starting

STEEL construction throughout has been used in the new Overland 1200-lb. delivery model just produced by the Willys-Overland Co., Toledo, Ohio. This is the largest Overland model yet produced, and, unlike previous delivery models, it is built on a chassis especially designed for commercial service instead of on a passenger-car chassis.



New Overland with steel express body

SPECIFICATIONS

Capacity, lbs.	1,200
Price, chassis	$725
Wheelbase	106
Tires, front	33 x 4½
Tires, rear	33 x 4½
Bore	4½
Stroke	4½
N. A. C. C. hp.	27.20
Final drive	Bevel

This model increases the commercial offerings of the Overland company to two models, the smaller 800-pounder and the new 1200-pounder. The new model is regularly equipped with electric starting and lighting.

The engine is a four-cylinder block type suspended direct from the frame. It runs on five bearings and is cooled by thermo-syphon circulation through a sheet-metal-incased cellular radiator. The valves are located to the right, and the Tillotson carbureter is fed by gravity from a tank beneath the seat.

Ignition is supplied by a Dixie magneto with hand spark advance, the starting and lighting system being wholly separate and of the two-unit type.

A cone clutch takes the drive to the three-speed selective gearset, located on the rear axle. Driving stresses are taken by the torsion tube which supports the front end of the gearset and incloses the driveshaft.

Semi-elliptic springs are used all around and all tires are mounted on demountable rims.

The driver's position is at the left, with the levers in the center, the vehicle being remarkable for the great amount of leg-room afforded and the low position of the driver's seat.

The body is a pressed-steel affair, the entire side-panels being single slabs of pressed steel. The floor is of wood with steel straps. A capacity for a load of 120 cu. ft. is provided, the length being 77¾ in., the width 44 in. on the floor and the height of the panels 15¾ in. Across the flareboards the body is 54½ in. wide. There is a 13-in. tailboard fitted with chains inclosed in leather coverings. There is a metal top over the body and cab, supported on steel stanchions braced in steel sockets. This top affords 56 in. of headroom.

Twin Services Enable Hartford Trucks to Keep at Work Continuously

(*Continued from page* 17)

the case of stone 3½ tons is nothing unusual and 5 tons frequent. In other words, a 150 per cent overload is a common occurrence.

A record is kept of costs, and the system is the outcome of a number investigated by Mr. Morrison. Each driver makes out a daily report and tells where he has been and how much he has transported, amount of gasoline and oil used, and the time spent for each delivery, condition of roads, weather and so on. On a large sheet at the office is kept a daily record of each truck, so that it is possible to tell at any time how much work has been done and how much it has cost.

As the business of the firm increases there will be need for additional trucks. The ones now in service are of a type generally regarded as obsolete, the engines being under the floor-boards and the cabs consequently very high above the ground. However, for all practical purposes they serve the purpose very well. This type was taken up principally because the members of the firm were at one time agents for the make in question. Then, too, the price to them as representatives was considerably less than if they were purchased in the open market.



Dumping 5 tons of crushed stone 4 miles from the quarry from which it has been hauled. Note that the sudden shifting of the load has raised the front wheels from the ground

FORD BODIES

(*Continued from page* 22)

Front- and rear-entrance bus models with open sides are offered together with rear-entrance type with side curtains with mica windows to form a police patrol model.

The characteristic unit of the types for use on roadster models is an open flareboard model with a high lip at the front end shaped to fit the back of the roadster seat. This protects it from scratches or damage which might be caused by the goods carried coming into contact with it while the vehicle is in motion.

Texas

Texas Wagon Works, Houston, Tex.

Texas bodies are made in seven models, the line being featured by a panel type with a special cowl-fronted cab designed to fit the cowl of the 1916 Ford without any change. Besides that model, three other panel types are made, each differing slightly in the dimensions and the design of the front end. One conventional open express model, one express type with top and one open flareboard roadster unit complete the line.

Wadsworth

Wadsworth Mfg. Co., Detroit

Detroit-made, Wadsworth bodies are offered in but two types, a panel and an open express with top. Six models are adapted from these, four panel units and two express types, one with open sides and curtains and the other with side screens. Two of the panel types are exactly alike except for the rear doors or tailgates. The remaining two differ from them only in that the clear loading length is a trifle more in each case. Special dash fillers are supplied for fitting each model on 1915 or 1916 chassis.

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FORMERLY, WHEN SUCH LINES WERE ABANDONED, THE RAILS WERE LEFT TO RUST AWAY BECAUSE THERE WAS NO MEANS AVAILABLE BY WHICH THEY COULD BE SALVAGED AT LOW ENOUGH COST TO WARRANT THE UNDERTAKING

Saving a Great Waste



THE MILITIA OF MERCY HAS BEEN FORMED IN NEW YORK TO MAINTAIN AN AMBULANCE SERVICE FOR PARALYSIS VICTIMS AMONG THE POOR

SALVAGING steel rails used on temporary feeder lines in the lumber country of the northwest is a new experiment undertaken by the Chicago, Burlington & Quincy Railroad and successfully, after every other known method had failed, through the application of the motor truck to the job. Formerly when such lines were abandoned, the rails were left to rust away because there was no means available by which they could be salvaged at low enough cost to warrant the undertaking.

Through the use of a standard commercial vehicle supplied with steel flanged wheels and also because of the increased value of steel, the Burlington Route has been able to save the cost of a great quantity of steel rails in good condition.

In the Black Hills of Montana the McLaughlin lumber and tie road connection had to be abandoned because of forest conservation action by the government. This line was about 35 miles in length and due to the forest

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THESE WERE CHRISTENED RECENTLY IN FRONT OF THE CITY HALL OF NEW YORK CITY AND SENT TO THEIR POSTS. ONE WENT TO BOSTON, ANOTHER TO BROOKLYN AND THE OTHER STAYED IN NEW YORK

reserve laws none but oil-burning locomotives might traverse the route to bring out the rails. None of this type were available and so the Burlington road gave the Black Hills Transfer Co., Nahant, Mont., the job of getting them out by some other means.

The only locomotives available were wood-burning ones, which were barred by law and, furthermore, the track was in such bad repair that the cost of putting it in shape for the passage of heavy locomotives would have been prohibitive. Then, too, there was a rank growth of grass and weeds over the tracks, rising in some places to a height of 18 inches, completely obscuring the track.

The contractor decided to apply a truck to the job and ordered a duplicate of a White 1½-tonner which had been in his service for 4 years, having covered more than 75,000 miles. The chassis was equipped with flanged wheels, sand boxes and a pivoted bolster and out of an old freight car truck was constructed a semi-trailer to carry the rails. The changes in the vehicle were made at the Burlington shops at Havelock, Nebraska, and sent to the job.

The Militia of Mercy

GASOLINE has proven an effective toxin against the child plague, dread infantile paralysis, which has baffled the medical profession in our eastern centers during the last year. The fluid is not used internally or externally, however, but as a means of saving the suffering victims often fatal delay and tedious journeys.

The Militia of Mercy has been formed in New York to maintain an ambulance service for paralysis victims among the poor. Many of these cases have been sadly neglected through the inability of their parents to pay for proper ambulance service to the hospitals. Three Studebaker ambulances of the regular sixteen-passenger bus types have accordingly been donated to seek out these cases and provide them speedy transportation to clinical institutions. These were christened recently in front of the City Hall of New York City and sent to their posts. One went to Boston, another to Brooklyn and the other stayed in New York.

The ambulances are fitted with special attachments for small stretchers for such cases as are unable to sit. In the christening little Miss Ellen Anderson, a victim of the disease, broke the proverbial bottle, containing milk instead of champagne. Many prominent women contributors to the Militia were present.



THE CHASSIS WAS EQUIPPED WITH FLANGED WHEELS, SAND BOXES AND A PIVOTED BOLSTER, AND OUT OF AN OLD FREIGHT CAR TRUCK WAS CONSTRUCTED A SEMI-TRAILER TO CARRY THE RAILS

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The Readers' Forum

Devoted to topics pertinent to commercial vehicle operation design and maintenance. Open to the use of all readers. Communications must be accompanied by the sender's name and address, confidential if preferred. No charge is ever made for this service.

CRANK-ARM DUMPING GEAR

Van Dorn Body Hoist Used on Garford and White Trucks

To the Editor, COMMERCIAL VEHICLE:

Will you kindly advise what motor truck manufacturers in this country make dumping trucks which use a crank arm in the mechanism for tilting the truck body or a rocking frame carrying the body?—ALBERT T. OTTO & SONS, INC., New York City.

THE COMMERCIAL VEHICLE has no knowledge of any truck manufacturing concern which makes such a body hoist as you mention.

However, the Van Dorn Iron Wks., Cleveland, Ohio, makes a hoist such as you refer to. Van Dorn hoists are used on many White and Garford trucks, made respectively by the White Motor Co., Cleveland, Ohio, and the Garford Motor Truck Co., Lima, Ohio.

RAINIER ON MARKET 2 MONTHS

Is New Design—Has No Connection with Old Rainier Passenger Car

To the Editor, COMMERCIAL VEHICLE:

Will you please advise how long the new Rainier 1,000-pound delivery vehicle has been on the market? Is it a new design? Is it the company's former vehicle with the running gear improved?—E. J. WARREN, Bangor, Me.

To answer your queries in the order given:

1—The Rainier 1000-pound delivery vehicle to which you refer has been on the market about 2 months, or since September 1, 1916. It was fully described in THE COMMERCIAL VEHICLE of August 15, 1916.

2—It is a brand new design. It will be offered in production during 1917, the maker, the Rainier Motor Corp., is now erecting a new factory in Flushing, L. I.

3—Like the truck, the Rainier Motor Corp., is a new concern which never marketed any except the present model. The new vehicle has no connection whatever with the old Rainier passenger car.

N.A.C.C. HORSEPOWER FORMULA

Reader Wants to Know How to Calculate Motor Horsepower

To the Editor, COMMERCIAL VEHICLE:

Will you please publish a formula for determining the horsepower of a gasoline motor such as used in a motor truck?—E. N. FRANCY, Toronto Foundry & Machine Co., Toronto, Ohio.

The formula for motor horsepower which is most commonly used is the N. A. C. C. formula, as follows:

$$\text{Horsepower} = \frac{D^2 N}{2.5}$$

Where

D = Bore in inches
N = Number of cylinders

This formula is based upon the fact that, with other factors remaining constant, a motor of the four-cycle type will deliver power in proportion to the area of its piston, the piston speed in feet per minute and the number of cylinders. The constant 2.5 was determined by experiment; assuming that a motor would develop its rated horsepower at a piston speed of 1,000 feet per minute.

The majority of present-day gasoline motors run well up over a piston speed of 1,000 feet per minute so that the formula does not really give the actual horsepower. But as this formula is the one almost universally used, it serves its purpose as a means of fair comparison between motors and as a basis for taxation.

ADDRESSES OF ADAPTER MAKERS

Reader Desires Street Locations of Tructor and Kelly Companies

To the Editor, COMMERCIAL VEHICLE:

Will you please give us the street addresses of the Tructor Mfg. Co. and the Kelly Convertible Auto Truck Co., both of Chicago, makers of Ford adapters, as stated in the Aug. 15, 1916, and Sept. 1, 1916, issues of THE COMMERCIAL VEHICLE?—METROPOLITAN MOTOR CO., Minneapolis, Minn.

The addresses are as follows:

Tructor Mfg. Co., 1502 Michigan Avenue, Chicago.

Kelly Convertible Auto Truck Co., 332 Michigan Avenue, Chicago.

Use the Supplement

(*See page* 35)

A perforated supplement to this issue will be found on page 35. It contains important corrections to the Annual Forecast Issue of Nov. 1. Tear it out, cut out the corrections, and paste them in your copy for reference throughout the year.

CITY MAPS OF DELIVERY RADII

Reader Finds Horse and Truck Zone Maps of Great Value

To the Editor, COMMERCIAL VEHICLE:

In reading over the October 15, 1915, issue of THE COMMERCIAL VEHICLE, I chanced to see on pages 18 and 19, maps of various cities giving the radius of horse, wagon and motor truck delivery. This is information which I shall be able to use to good advantage. Have you at any other time published similar information on any other large cities?—ANDREW A. WELDEN, Cadillac, Mich.

While THE COMMERCIAL VEHICLE has not published during the past 2 years any maps exactly similar to those mentioned, it has printed many maps showing the horse and truck radius of delivery of separate concerns in all parts of the country. A few of these and the issues in which they appeared are as follows:

March 1, 1914, pages 6 and 22:

Map of Rhode Island and the territory immediately surrounding Providence, with concentric circles indicating the zones of motor delivery from Providence as a center. The area served by one of the largest of Providence's department stores is also indicated.

May 15, 1914, page 20:

Map of Hartford County, Conn., of which Hartford is the center, showing the zones of motor delivery with especial reference to a proposed plan for the establishment of a trucking concern to deliver packages of stores within the Hartford territory at a fixed rate of so much per package over a certain area.

August 15, 1914, page 6:

Map of the district of Greater Pittsburgh showing the small area of the city itself and the large tributary territory in the valleys of the Ohio, Allegheny, Monongahela and Youghiogheny rivers. Three circles with radii of 7, 13 and 35 miles, respectively, drawn about the shopping district of Pittsburgh as a center, show the three delivery areas of the Kaufmann & Baer department store, representing zones of four-time, two-time and one-time daily deliveries.

November 1, 1914, page 6:

Map of New York City and the surrounding territory in which beer is delivered in kegs and bottles by means of motor trucks. Concentric circles, 5 miles apart, show the delivery zones of horses,

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electric trucks and gasoline commercial vehicles.

February 15, 1915, page 6:

Map of Philadelphia, showing the location of the coal yards of the Owen Letter's Sons Co. and the radius of that concern's motor truck and horse wagon delivery.

July 1, 1915, page 20:

Map of Manhattan Island and Brooklyn, showing the radius of delivery of the electric trucks used by the Loose-Wiles Biscuit Co., Long Island City, N. Y., for its retail store deliveries.

August 1, 1915, page 6:

Map of the Metropolitan section of New York City, showing the location of the B. T. Babbitt, Inc., plant at Babbitt, N. J., the area formerly served by its horses and the territory now served by its trucks.

August 15, 1915, page 6:

Map of New York City and adjacent New Jersey, showing the location of the Central Stamping Co.'s plant in Newark, N. J., and the areas formerly served by horse wagons and now by motor trucks.

INSTALLATIONS OF DEMOUNTABLE TRUCK BODIES

Truck Maker Wants Information on How to Increase Efficiency

To the Editor COMMERCIAL VEHICLE:

Will you please furnish me with whatever information you have at hand regarding demountable bodies for motor trucks?—JOHN DRYER, Kleiber & Co., San Francisco, Cal.

Among the descriptions of demountable truck bodies which have appeared in THE COMMERCIAL VEHICLE since January 1, 1914, are the following:

April 15, 1914, page 23:

An illustrated article descriptive of the method employed by the Royal Metal Furniture Co., Brooklyn, N. Y. Two demountable bodies are used in connection with one 3-ton Garford truck. The empty body is pulled off the chassis onto one end of an inclined platform entirely within the Royal company's warehouse and the loaded body similarly pulled onto the truck after the latter has run to the other end of the platform. The truck and the two bodies have replaced seven teams of horses formerly used and in addition have trebled the delivery radius of the company. This was made possible by the elimination of the idle truck time previously spent in loading.

June 1, 1914, page 7:

Part II of an article descriptive of the motor equipment of the New York City milk dairies, showing how the detachable semi-trailer bodies are employed to save loading and unloading time. While these bodies are not of the demountable type in the usual construction of the word, they nevertheless may be so considered, differing only in the fact that they are equipped with wheels suitable for street service instead of small rollers or other means of mobility.

July 1, 1914, page 14:

The above article describes the two demountable bodies, two small hand wagons and one 3-ton Packard truck in the service of the Kindel Bed Co., Brooklyn, N. Y. One body is loaded on the hand wagon inside the company's plant and then pulled out on the street and transferred to the truck chassis after the empty body has been removed from it onto the other hand wagon. The latter is then drawn into the plant and the body loaded while the truck is on its delivery route.

July 15, 1914, page 28:

A short article descriptive of the novel demountable body in use by Brownell & Field, wholesale grocers of Providence, R. I. The body is fitted with rollers and with a special spring attachment for securing it to the truck frame. It is removed from the truck and put on it by means of an overhead telpher system which extends from the edge of the loading platform clear to the far end of the shipping and packing room.

October 15, 1914, page 28:

Part II of an article describing how the Curtis Publishing Co., Philadelphia, Pa., has been able to make its trucks pay large dividends on very short hauls by means of demountable bodies deposited on and lifted from the truck chassis by means of electric hoists. The demountable bodies are of two types, one with staked sides for the handling of bags of mail and the other of the steel V-bottomed type for the handling of coal. After the trucks' work is finished in hauling the mail, the staked bodies are removed and the coal bodies fitted in their stead, thus enabling the same trucks to perform two vastly different classes of work. The hoists are fitted at both ends of some of the routes.

March 1, 1915, page 30:

A short illustrated article describing the nest lumber body used by the Hawkeye Lumber & Coal Co., Cedar Rapids, Iowa. Transverse rollers are carried on the truck body platform and serve to enable the loaded or unloaded nest body to be pushed on or off the truck and onto an elevated platform of the same height as the truck platform.

June 1, 1915, page 5:

The tractor and demountable semi-trailer equipment of the New York City Municipal Asphalt Plant is described in the article under this date. The equipment is the first of its kind and employs semi-trailers which are loaded at the plant, pulled to the waiting tractors by means of small removable fore-carriages and then attached to the tractors. These haul them to the job where other fore-carriages are employed and the trailers moved from point to point on the work by means of the steam rollers which finish the street surface. Meanwhile the empty trailers on the jobs are attached to the tractors and hauled back to the plant where loaded trailers are waiting.

July 15, 1915, page 22:

Part V of an article descriptive of the delivery equipment of the Loose-Wiles Biscuit Co., Long Island City, N. Y., in which it is pointed out how the efficiency of some of the company's trucks may be considerably increased by the use of nest bodies, nest loading bins and roller gravity conveyors for transferring the goods from the bins to the trucks.

November 15, 1915, page 5:

Concluding article regarding the demountable body equipment of the Curtis Publishing Co., Philadelphia, Pa., in which is described the method of removing the demountable bodies of the mail trucks of the company at the Broad Street station of the Pennsylvania Railroad in that city.

February 15, 1916, page 5:

A complete description of the demountable bodies used by Haas, Baruch & Co., Los Angeles, Cal., wholesale grocers. The special equipment mounted on the trucks for removing the empty bodies and pulling the loaded ones aboard is shown, together with illustrations depicting the bodies in the course of being removed.

March 15, 1916, page 28:

A short illustrated article of demountable bodies which have practically eliminated the idle loading time of the motor trucks of the A. T. Stearns Lumber Co., Neponset, Mass. Two bodies are employed for each truck, one being loaded at the lumber yard while the other is on the truck making its deliveries. Ordinary four-wheeled wagons are used to transfer the empty bodies around the yard for the loading of the various lengths of lumber, etc. The loaded body is then transferred to a beam device which is elevated by means of screw jacks so that the truck may back under it. The empty truck body is previously unloaded on a similar device from which it is deposited on another four-wheeled hand wagon.

FLANGED WHEELS FOR RAILS

West Virginia Wants to Equip Trucks to Run on Railroad Tracks

To the Editor, COMMERCIAL VEHICLE:

We would be pleased to have you furnish us with the names and addresses of concerns which manufacture flanged steel wheels suitable for use on motor trucks to enable them to run on railroad tracks of standard gage.—GARY GARAGE, Welch, W. Va.

The only concern which manufactures flanged steel wheels for motor trucks as stock equipment, of which THE COMMERCIAL VEHICLE, has record, is the Goodman Co., Herrin, Ill.

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REFRIGERATING TRUCK BODIES

Who Makes Mechanically-operated Cold-Storage Van?

To the Editor, COMMERCIAL VEHICLE:

Do you know of a motor truck equipped with a mechanically-operated refrigerating system, as for use in the ice cream trade or for carrying other perishable products? — HENRY FARRINGTON, Chicago.

Such a body has been projected and at one time it was planned to organize a company to manufacture it, but so far as THE COMMERCIAL VEHICLE has a record of, the body was never manufactured. In cases where it is necessary to have a refrigerator body ice is usually carried. This is admittedly a crude and expensive method of icing the body, for the ice itself is heavy and therefore requires a heavier truck than would be needed were there a mechanical refrigerating system on the truck.

The machinery for salt-brine and ammonia refrigerating can be adapted to drive from the clutch shaft without great trouble and it remains for some enterprising manufacturer to adapt the truck to this class of work. There should be a large market for such an outfit among florists, caterers, meat packers, butchers, poultry dealers, fruiterers and others who haul perishable goods over considerable distances in hot weather.

FIGURING COMMERCIAL TON-MILES

Sum of Trip Ton-mileage Gives Total Figure for Month

To the Editor, COMMERCIAL VEHICLE:

I have one of your circulars describing your Standard Cost System for Motor Trucks and observe that your column 13—average commercial ton-miles, etc.—is obtained by Item 11 x Item 12. Your column 18—total commercial ton-miles, etc.—being obtained by Item 7 ÷ Item 13. Should not this be 7 x 13, or else 6 x 8?—G. O. WILLIAMS, Philadelphia, Pa.

The formulas as given on the sheet are correct, excepting Item 18, which, as suggested, should be Item 7 x Item 13, or the number of trips for the month multiplied by the average ton-miles per trip. Item 6 x Item 8 will not yield the proper figure. The error of the printer is responsible for the wrong symbol being inserted on the first series of sheets. Subsequent issues will be corrected.

ENTERING TRUCKING BUSINESS

General Discussion of Haulage and Delivery Contracting Opportunities

To the Editor, COMMERCIAL VEHICLE:

I have been a consistent reader of your magazine for the past few months and have conceived the idea of engaging in the trucking business in this city. If it would not greatly inconvenience you, I would be very glad to have you advise me what possibilities are offered in this business; that is, what percentage of profit is usually earned under normal conditions on the various sizes of motor trucks. I would also appreciate the receipt of any other information along this line that you can consistently furnish. Should you be unable to advise me in this regard, I would thank you to refer me to some source where this information might be obtained other than from truck manufacturers.—GEORGE E. WHITLOCK, Detroit.

The trucking business offers boundless opportunity for intelligent enterprise, but it is not an industry in which capital alone can succeed. Capital is needed and experience is essential; but of the two the latter is the greater requisite. There are men in this country who are capable and available if you lack personal experience. The percentage of profit depends entirely upon local and individual conditions. There is no reason why motor trucking should yield any less or any greater return on capital invested than any other conservative, well-run enterprise.

The profit is made by the ability of the trucking concern to operate its trucks for less money than a merchant owning his own vehicles. In some cases, where the merchant has a fluctuating volume of deliveries, this is easy, but in others, where the merchant does a steady business of considerable volume, it is difficult. On the other hand, the latter class is the safest to deal with, since there is less adjustment of vehicles, routes and drivers to varying demand than is the case with the first class of client, and the latter is more apt to be responsible.

A contract with an ice company and another with a coal company will so fit together as to form an ideal job for a hauling contractor, since he can keep his vehicles running at full capacity the year round, shifting them from one class of work to the other in proportion as the seasons change from hot to cold and vice versa. The cost of keeping a fleet of trucks for such seasonal work must of necessity be higher than that which the contractor who operates his trucks the year round should have to bear.

Being engaged in transportation exclusively, it should be possible for the trucker to pay closer attention to details, stopping small leaks and instituting aids to greater efficiency than is the case with the owner of trucks used as an adjunct to a line of business of different nature. Furthermore, the trucking contractor usually has a fleet large enough to permit large economies in purchasing, housing and maintenance.

The above is general and at random, in kind with the general nature of the inquiry, but more detailed analysis will be made in response to more pointed questions.

HUGE MOTOR FREIGHT TRUCKS

20-ton Gasoline-electric Vehicles Largest Ever Manufactured

To the Editor, COMMERCIAL VEHICLE:

One often hears the observation that the whole trend of motor trucking is toward larger units and that every year sees heavier motor trucks upon our streets. Somewhere, it seems to me, I recall having heard of some very heavy trucks that were formerly manufactured, but which are not now on the market. If I recall correctly, the 10-ton Hewitt was made in considerable numbers, but is now no longer manufactured. Can you give me some information on these points and explain the reasons?—H. C. MERRILL, Cleveland.

The trend of motor trucking is toward greater efficiency. When practicable, efficiency calls for the greatest load units practicable under the conditions encountered, but owing to the limitations in the amount of load which is required for any given trip, the average load continues small.

Engineering development tends toward producing lighter vehicles instead of heavier ones and more and more progressive users are covering greater area with smaller and swifter vehicles.

The motor juggernauts to which you refer are no doubt the Great Western road freighters built some years ago by the Great Western Transportation Co., Chicago, and especially intended for service in mining countries, such as the Arizona gold fields, where a number were placed in service. These were of 10 and 20 tons capacity and were of the gasoline-electric type. The Hewitt truck is no longer manufactured, nor is there any truck of greater capacity than 7½ tons now on the American market.

The reason for the abandonment by manufacturers of such heavy trucks is that the occasions which require such vehicles are so few that it does not pay to manufacture the vehicles. The same loads can be handled more economically by tractor-and-trailer trains than by self-contained trucks. Indeed, it may be said that the tractor and trailer have crowded out the very heavy road freighter, to the great good of both the user and the public roads.

PNEUMATIC GARAGE DOOR OPENER

Device Opens Door by Compressed Air Power—The Manufacturer

To the Editor, COMMERCIAL VEHICLE:

If you have or know of any device for opening the sliding doors of our service station by compressed air we would be very glad to get this information.—FEDERAL MOTOR TRUCK Co., St. Louis, Mo.

The National Pneumatic Co., 50 Church Street, New York City, manufactures a device of this nature.

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TRUCK COST SYSTEM FOR ARMY

How Ton-mile Serves as Performance Comparison in Practice

To the Editor, COMMERCIAL VEHICLE:

I have been instructed by the Department Signal Officer to prepare a form for the compilation of motor truck operation and cost. This form must have a unit to enable comparison between good and poor operation and efficiencies of different makes.

I have never heard of any such unit except the ton-mile, which does not seem to apply, as its cost is not the same under different conditions. For instance, a truck carrying 1 ton 3 miles and one carrying 3 tons 1 mile, each produces 3 ton-miles. Yet the cost per ton-mile is very different. Again, a truck making all its trips loaded will show a less cost per ton-mile than one only partly loaded.

Mr. George Neill of the Packard Motor Car Co. has referred me to your paper as one which has made "a specialty of analyzing the cost of operation of motor trucks."

I would greatly appreciate any information on this subject you have at hand and request that you refer me to any articles you may have run.—LEIGH S. J. ZERBEE, First Lieutenant, C. A. C., U. S. Army, Fort Sam Houston, Tex.

Your work has already been done. Years of study along lines indicated by Mr. Neill has terminated in the design of THE COMMERCIAL VEHICLE Standard Cost System for Motor Trucks, which is so thorough and universal in its application that, though designed for commercial users of motor trucks, should fulfill every requirement for army use. A feature upon which special emphasis is laid is the incorporation of a comprehensive performance record which enables the efficiency of different vehicles to be compared and the efficiency of different methods and conditions of operation to be determined.

There is nothing wrong with the ton-mile as the unit for the purpose you desire, but, as often figured, it is decidedly confusing. There are two forms of ton-mileage: what has been termed the *absolute* ton-mile, which is a scientific figure, and the *commercial* ton-mile, especially adapted to figuring operating efficiency and as a measure of work done.

The absolute ton-mile may be eliminated for your purposes, since it does not give a useful figure for cost computations, since it does not take into account the mileage without load. Furthermore, it requires so much computation and such close checking of mileage and tonnage that it is impracticable for other than test work.

The commercial ton-mile, on the other hand, is very easily figured and does include the empty mileage as work essential to the performance of the task to which the truck is applied. It is figured by multiplying the total tonnage delivered per trip by the total mileage run on such trip.

The incorporation of this figure in a cost computation will not give the same ton-mile cost for all classes of service, since different methods of use will naturally produce more or less economy. Thus, in the instance cited, the cost per ton-mile for a 3-ton truck which runs 3 miles to deliver but 1 ton will be higher than that of a similar truck which delivers 3 tons in 1 mile. The determination of this fact and how much more it costs per ton-mile to operate by the first method than by the second is the purpose of the ton-mile figure.

That a truck which operates under a high load factor will show a lower cost per ton-mile than one which runs empty a greater portion of the time is a natural conclusion and the fact that the proper ton-mile figure will reveal this and show the relation between the costs proves its value as a performance gage.

What the operator of any truck needs to know is what it is costing him to do his work with a given truck equipment and under given operating conditions. Knowledge of what it costs to do this work with different vehicles and by different methods of operation serves as a guide as to which vehicle is best adapted to his needs and which method of operation gives the best efficiency.

The scientific figure of the actual cost of running the truck for a given distance under a given load is valueless to the practical user, since it is a fact that it costs nearly as much in most coses and in some cases more to operate a truck under no load as under its full capacity burden. To determine the mechanical economy of a truck the cost per mile under full load may be used. This figure is purely hypothetical, however, no matter how carefully checked, since it only represents what the truck will do under certain road and weather conditions and is no guide as to what its year-in and year-out performance will be. The latter can only be determined by a careful account of costs, day by day.

In THE COMMERCIAL VEHICLE of April 15, 1915, was an article entitled "What the Ton-Mile Is and How to Figure It," which explains this matter more fully.

Motor Truck Insurance a Business Proposition

(*Continued from page* 15)

phases so that the assured is deprived of certain benefits. An insurance policy is a contract, and like all contracts, should be carefully read and thoroughly understood before accepted. Be sure to get a policy from a company of strong financial standing. Companies which have been writing motor vehicle insurance for some time have legal departments in which are experts on negligence law. They have a system cataloging thousands of fake claims and claimants and are prepared for all the tricks of the well-known ambulance chasers and their prey. Financial strength insures that they will be able to pay losses that may mature many years hence as the result of injuries inflicted now.

There are two classes of insurance companies, the stock and the mutual. When one buys insurance from a stock company, he buys it as he does any other commodity; the company is a corporation which sells insurance at so much. Mutual companies are somewhat like associations, the assured being a member and getting his insurance at cost. Thus, if several hundred truck owners wish to insure themselves, they may secure a charter as a mutual insurance company. The premiums are settled at a certain rate and the business is conducted by salaried or commissioned employees, and at the end of the fiscal year any surplus above and beyond the needs of the business are returned to the members *pro rata* as a dividend. If, on the other hand, there is a deficit, the members are assessed *pro rata* to make it up. Under normal conditions, mutual insurance is cheaper than that from stock companies, but if the losses are heavy, either through disaster or mismanagement, it may conceivably become more expensive.

Some insurance companies issue liability, property damage and collision policies and others fire and theft. Under the law no liability company is in a position to write fire insurance, but to-day it is possible for an assured to get a combination policy covering all hazards. Affiliated companies jointly issue the above combination policies. Recently loss of use insurance, paying the assured an indemnity while the truck is laid up for repairs, due to fire, transportation, theft and collision, has been offered.

Rates

Rates for liability and property damage insurance on trucks are based upon the business hazard and the locality, traffic conditions in the larger cities calling for rates greater than their small-town cousins.

Collision insurance is based on the original list price of the machine, plus any additions or alterations that may have been made to same. Fire and theft insurance are figured on the original cost, age of vehicle, new or second-hand, and locality. It is a difficult matter to quote rates without knowing each individual case and it is not here attempted to do so, believing that such an action will be confusing to the reader. Any insurance broker or company will willingly furnish specific rates upon request.

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Accessories for the Truck

CAMELFORD

Designed for no other purpose than to reinforce the Ford chassis as it stands without increasing its capacity appreciably, but merely strengthening it to endure the rigors of commercial service, for which it is not designed, the Camelford has been brought out by the Maremount Mfg. Co., 916 South Wabash Avenue, Chicago.

Where the Ford suffers when forced to operate as a commercial vehicle, under loads in excess of its normal capacity, is on the rear spring. The Camelford reinforces the chassis at this point by applying a pair of semi-elliptic springs directly between the body floor and the brake-drum flanges, so that neither the axle nor the frame are affected by the body load.

This is accomplished by bolting two goose-necked yokes to the flanges by means of the same bolts which now hold the radius rods on one side and that which holds the brake-band stud on the other.

The spring perches are mounted on the goose-necks and the springs are shackled at both ends to brackets which bolt to the bottom of the body. The outfit sells for $40.

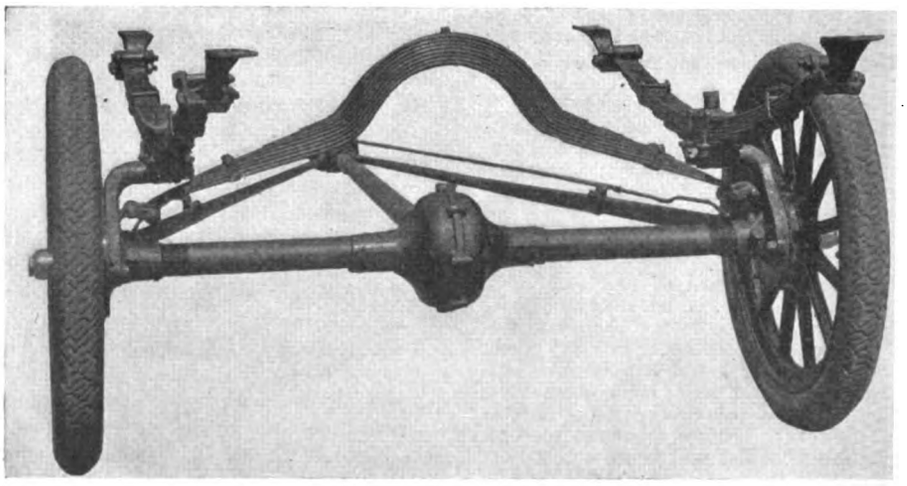


Fig. 1—Ford rear system with Camelford attached

VESTA CENTRIFUGAL-ELECTRIC DRIVE

Combining the functions of a flywheel, clutch, gearset, starter and lighting generator, the Vesta centrifugal-electric drive, although not as yet applied to a commercial vehicle, seems to possess merits which would commend it to such use. Unlike other forms of electric transmission, this device affords a positive mechanical drive for all speeds above a certain medium, while retaining the automatic features of other systems.

The Vesta system is produced by the Vesta Accumulator Co., Chicago, and comprises a generator turned inside out. By this is meant that the fields are the inner member and the armature the outer. It is designed to fit on standard gasoline engines instead of the flywheel and is adapted to inclosed unit power-plant application.

The armature is the flywheel and carries an internal commutator. Within the flywheel is the field member, attached to the driveshaft and carrying large carbon brushes within the commutator, and a series of collector rings. Behind this, if needed, a two-speed gearset may be attached to afford a very low speed for extraordinary conditions and a reverse.

The action of the device is magnetic on starting, the magnetic drag of the armature for the field causing the fields to follow the armature at a reduced speed. The slip between the two members is decreased as the vehicle gains headway due to the decrease in the torque occasioned by the overcoming of the vehicle's inertia and also to automatically-varied field resistance, so that the vehicle gains headway gradually. The carbon brushes are mounted in a special holder, which exerts a light spring pressure to keep them in contact with the commutator at low speeds. Besides this, the brushes are weighted, so that as the field gains speed they are thrown outward against the commutator at an increasing pressure until at a predetermined speed, they serve as a friction clutch and the armature and fields turn as one.

Difficult road conditions which slow down the vehicle cannot stall the engine, however, for as soon as the speed falls below the predetermined point, the brushes release their hold upon the commutator and the vehicle drives electrically again. This electric drive gives any required reduction, so that, as stated before, except in extreme cases no low gear is needed.

The current which is generated by the slip of the fields within the armature is used to charge the storage battery which supplies current for starting and lighting and for exciting the fields. This excitation, or change in field resistance, is variable, being determined by the controller, controlled by the throttle. Thus, as the throttle is opened, the field resistance is increased, so as to provide accelerating ability.

Starting is accomplished by locking the fields against rotation and running the current through the machine as a motor, causing the armature to revolve about the fields. The current for starting is also passed through the controller in such manner that starting is accomplished at 24 volts and 50 ampere-hours, the battery being in series, but for charging the battery is connected in parallel at 6 volts, 200 ampere-hours. The controller is so constructed that it is impossible

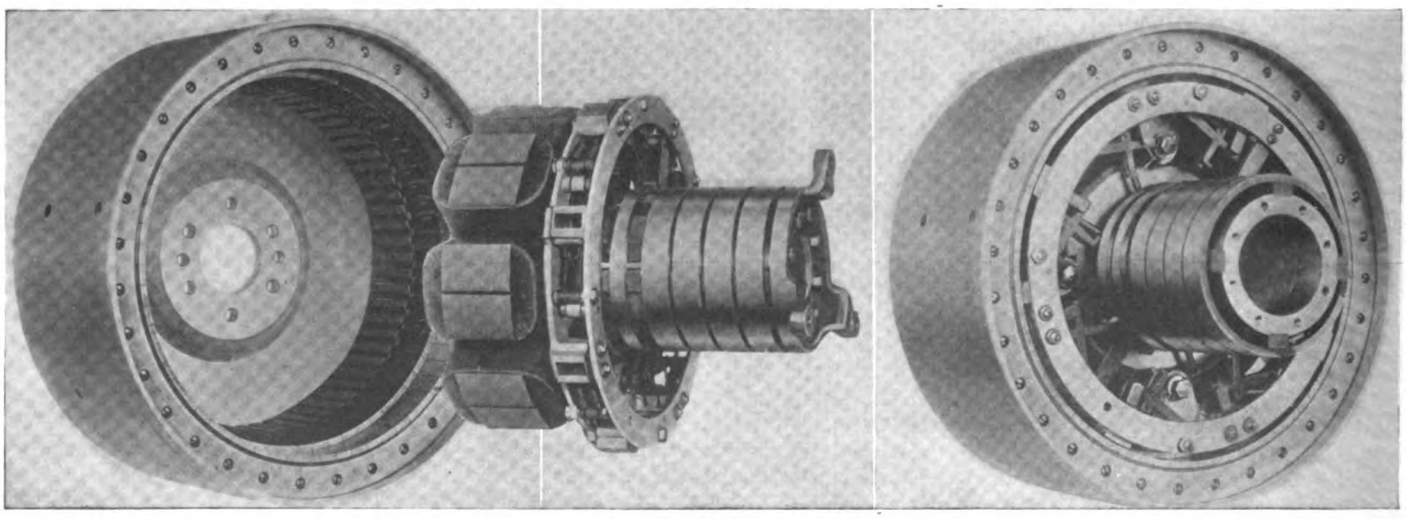


Fig. 2—Vesta electro-centrifugal drive, showing external armature at left and internal fields withdrawn. The bright portion at the outer edge of the armature is the commutator. In a corresponding position on the field unit are the weighted carbon brushes. The small-diameter portion consists of the collector rings. To the right is the complete unit, assembled

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for the two circuits to be thrown in at once.

As far as the operator is concerned, the control is entirely by the starting button and the throttle. Pressure of the starting button causes the fields to be locked against rotation and throws the 24-volt current across them. Pressure of the throttle excites the fields and more pressure successively introduces stages of increased field resistance. The centrifugal clutching takes place automatically and without even the knowledge of the driver.

It is said that the outfit does not exceed the weight of the members it replaces and that it costs about the same.

COVERT MODEL L GEARSET

Newest among the line of gearsets produced by the Covert Gear Co., Lockport, N. Y., is its Model L, especially adapted to light trucks with small, high-speed motors, since the reduction range is unusually great, giving a reduction on low of 3.61 to 1. It is of the unit power-plant type and incorporates a Borg & Beck dry-plate clutch.

The gears are of 7/9-in. pitch and ¾-in. face, made of nickel steel, heat-treated and ground. The main shaft is square except at the bearings and glands and has a spigot bearing of the solid annular roller type. The layshaft is a hollow tube with the reverse pinion integral. This latter feature permits the layshaft bearings to be mounted within the layshaft on a fixed bar. These bearings also are of the solid roller type. The main shaft runs on a Hyatt roller bearing at the front and a double-row annular ball bearing at its rear end. The reverse idler pinion also runs on a Hyatt bearing.

A ball-and-socket-mounted, ball-ended and ball-handled gearshift lever is applied, ball-plungers serving to retain the shifter rods in position. The brake lever is mounted at the side of the control standard, its shaft being bent to form the short-arm. Its angle is adjustable so that it may pull fore and aft for rear-wheel brakes or vertically for a drive-shaft brake.

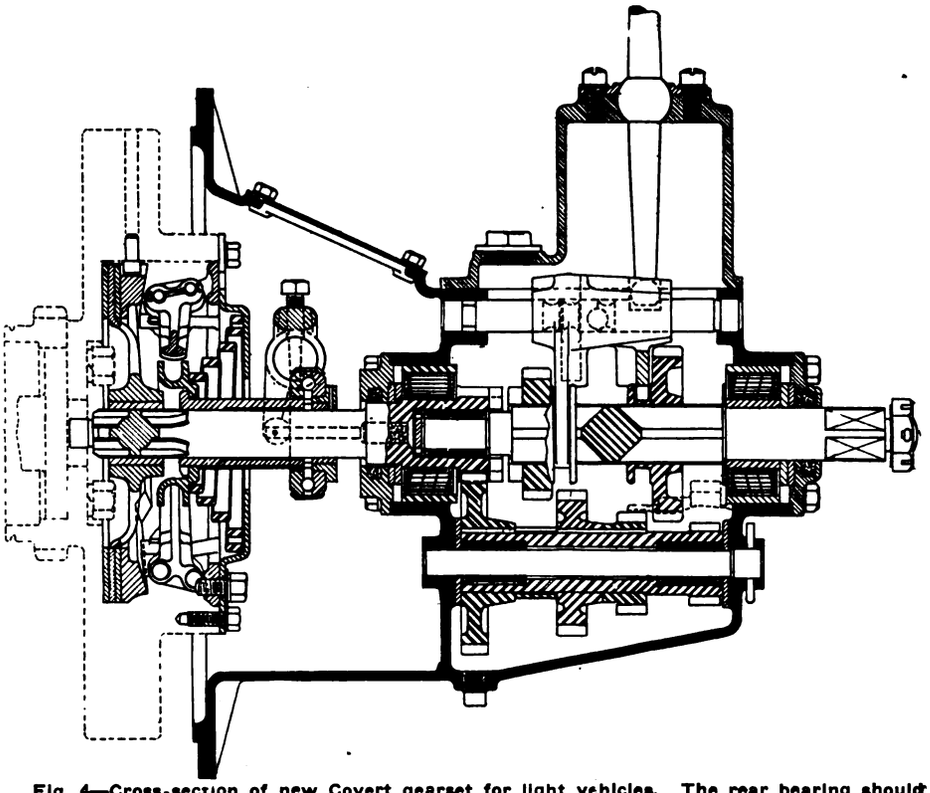


Fig. 4—Cross-section of new Covert gearset for light vehicles. The rear bearing should be a double row annular ball type instead of the Hyatt type shown

WALTER WORM DIFFERENTIAL

Self-locking by inherent characteristics of worm gearing, the Walter differential, made by Maurice Walter, 49 west Sixty-sixth street, New York City, is now being made in a form especially adapted to use on worm-driven trucks. A number of the original models of this type of differential have been used in France, the French government having been so convinced of its efficacy that it waived its requirement of differential locks.

In the new design the worm pinions are six in number, all retained in a disk-shaped central web, bolted to the casing and permitting the whole design to be symmetrical instead of offset, as so many differentials are. In his own words, Mr. Walter thus describes the action of his differential:

"The worm gears are all right-handed, the worms being of 27 degrees lead angle. The housing construction has been improved, the worm gears being mounted in a center piece and bolted to the two halves which form the housing and support the drive shaft worms. This design is entirely interchangeable with the present differentials, no change of worm gears, bearings or shafts being necessary.

"A differential should, on a turn, not merely differentiate but compensate the speeds of the drive wheels and equalize the torque to the drive wheels. If, like the ratchet types, it does not compensate, then the average speed of the two wheels is greater on a turn than on a straight-away so as to really gear up the car, a serious objection on a steep turn. The ratchet types only drive the wheel of most resistance, or the inside wheel, and the high friction types because of the low operating efficiency, concentrate the power on the inside wheel, thus tending to turn the car in the opposite direction.

"In order to understand why this worm gear device has the desired locking action and still retains the correct differential action, it is necessary to understand the fundamental characteristics of self-locking worm gearing on which it is based. With a worm and gear of, say 15 degrees lead angle, the worm will easily start and drive the worm gear, but the worm gear cannot start the worm. The greater the pressure, the greater the static lock. If the worm is given a start, then the worm gear will continue to drive the worm with an efficiency of about 80 per cent. This action, characteristic only of a worm gear driving a worm of less load angle, is the fundamental principle why this device has a static lock and a high operating efficiency so as to give equalized as well as compensating differentiation.

"If a drive wheel leaves the ground or loses its traction, it is not accelerated because the worm gear cannot start the worm on that drive shaft the device is in a static lock condition. On turning, however, the initial tendency of the outside wheel to rotate faster releases the static lock and the device then drives the outside wheel faster and the inside wheel slower, giving correct differentiation. If the tires are of unequal size the same action takes place.

"In actual service it is not necessary to use wholly self-locking worm gearing because a drive wheel always has some driving resistance, either its traction or its inertia, and this resistance will give the desired locking action with gearing up to about 30 degrees' lead angle. This construction can be made with any desired lead angle, but 27 degrees is used because it gives the best result in service. With this angle the worm gearing not only has a very smooth and quiet differential action, but in case of shock the gearing will slip enough so as to divide the shock load between the two shafts, so that stronger drive shafts are unnecessary. It should be noted that if 45-degree gears be used, there can be no static lock action, as the gears drive each other equally well. Adding more gears merely increases the friction."

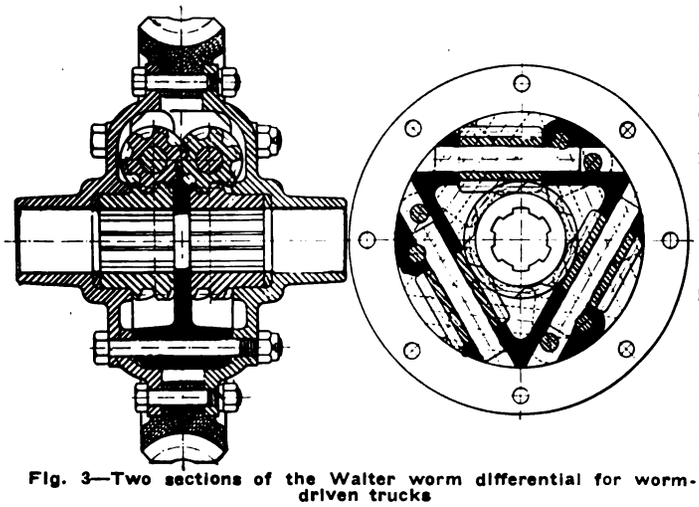


Fig. 3—Two sections of the Walter worm differential for worm-driven trucks

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Men and Makers

FOUR WHEEL DRIVE AUTO CO., Clintonville, Wis., is spending approximately $20,000 in new tools and equipment for additions now being completed. It has a standing order for twenty trucks per week for an indefinite period, and is now producing four a day. By Jan. 1 the output is expected to be six a day.

Autocar Co. has just entered its new two-story addition to the main plant at Ardmore, Pa. The building has a floor space of 85,000 sq. ft., is of fireproof brick and concrete construction, and will be used for final work on chassis and bodies. The chassis will reach the new building after the final road test, and here all painting, finishing and shipping will be done.

Packard Motor Car Co. of New York has acquired additional property in Long Island City, N. Y., adjoining its present service station, on which it will erect an eight-story building, which will more than double the service facilities for the metropolitan district.

Baker Motor Sales Co., distributor of Selden trucks in New England, held its annual meeting last week at its salesrooms, 400 Massachusetts Avenue, Cambridge, Mass. W. D. Leahy was elected president, F. P. Dillon vice-president, W. H. Baker treasurer and Judge J. C. Lynch secretary. Mr. Baker was again made business manager, and the above officers will comprise the board of directors. The annual report showed that the company has sold sixty Selden trucks the past year, and the new service station has been a big asset to the business.

Used Packard Trucks in the metropolitan district will hereafter be handled in a separate salesroom recently opened at 241 West Fifty-sixth Street, New York City. H. M. Neville and W. E. Bleezard will be in charge of the new salesroom.

Commercial Body Co., Trenton, N. J., manufacturer of motor truck bodies, has acquired property at 809 South Broad Street for an addition to its plant.

Fulton Co., Milwaukee, Wis., manufacturer of Eklips spark plugs and Aermore exhaust horns, has taken over the entire output of the C. & E. Mfg. Co., Marshalltown, Iowa, comprising cut-outs, wheel-pullers, accelerators, pedals, fender braces and Ford camshaft bearings for general distribution to the jobbing trade in the United States and Canada.



Shipment of Commerce ¾-ton chassis to the English agents of the Commerce company. They will be fitted with special bodies in London and then forwarded to points on the Continent, where they will be put in field service with the Allies. This shipment is but one division of a series of similar ones.

Cotta Transmission Co., Rockford, Ill., will be in its new factory building before the new year. It is of the monitor type, with walls of glass set in steel sash and but one floor in height. It affords a floor space of 27,000 sq. ft.

Holt-Welles Co., New York City distributer of Browne and Bradford carbureters, has recently elected the following officers: E. H. Stickels, president; F. E. Hamilton, vice-president; Calvert Holt, treasurer, and Paul Welles, secretary.

New Bosch Service Stations have been established at ten points in this country, each equipped with complete special sets of tools and testing apparatus and with one or more men in charge who have been trained at the Bosch service schools. They are: A. L. Ebbeson, Bangor, Me.; Auto Service Co., Bridgeport, Conn.; Wilson Electric Co., Jacksonville, Fla.; Harrington Motor Co., Mobile, Ala.; Garlock & Haynes, New London, Conn.; Auto Ignition Co., San Jose, Cal.; Essanell Electric Co., St. Paul, Minn.; Tonopah Electric & Tire Co., Tonopah, Nev.; Tri-State Garage, Uniontown, Pa., and Tourist Garage & Motor Repair Co., Wilmington, Del.

Frank K. Dolbeer, formerly of the financial department of the Victor Talking Machine Co., Camden, N. J., at a meeting of the board of directors of the Willys-Overland Co. on Nov. 4 was elected treasurer of the latter concern to succeed Walter Seward. Mr. Seward has resigned, but remains a director of the company.

George Cushing, resigned as advertising manager of the Federal Motor Truck Co., has entered the advertising department of the Hudson Motor Car Co.

Day Baker, manager of the agency department of the General Vehicle Co., Long Island City, N. Y., resigned that position on Oct. 1 last. Due to Mr. Baker's age and his many years in the motor vehicle industry, it is thought



First ten of a fleet of 100 Brockway 2-ton trucks recently ordered by the Adams Express Co. This is the third order for this make radiator guard built of heavy steel rods and woven wire. The complete order is to be delivered by January 1. On account of each truck, the separate body occupying one end and the chassis the other. Thus a 100-car train will be needed to transport the throughout the entire Adams system. Indianapolis, Kansas City and Minneapolis

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that he has retired from active work. He is now at his home in New London, Conn. His successor at the General Vehicle Co. has not been selected.

Charles N. Gillette, formerly Southern district sales manager for the Chase Motor Truck Co., has gone over to the Selden Truck Sales Co. to serve in the same capacity, with headquarters at Charlotte, N. C.

Charles E. Collard has resigned as Philadelphia branch manager for the Chase Motor Truck Co. to join the Selden Truck Sales Co. under his old chief, H. T. Boulden. On Nov. 1 Mr. Collard was made division sales manager for the Philadelphia territory.

J. K. Webster, formerly secretary and treasurer of the Gramm Motor Truck Co., who retired some time ago on account of ill health, died in Detroit on Oct. 27.

N. L. Le Blond, formerly secretary and general manager of the Hannibal Motor Wagon & Body Co., Hannibal, Mo., has been made Western manager for the Dearborn Motor Truck Co., with headquarters in Kansas City.

August Gilmore of Chicago has succeeded N. L. Le Blond as general manager of the Hannibal Motor Wagon & Body Co., Hannibal, Mo. Miss Hattie Salee has taken over his duties as secretary.

Newell Lyon, for 3 years general sales manager for the White Co. in western New York State, has been made manager of the Kansas City branch of the company, recently established to succeed the Kansas City White Co.

Churchill Chambers has taken the position of retail sales manager of the Vim Truck Sales Co., Chicago, having resigned from the sales staff of the local Locomobile organization.

Harvey Herrick has ascended to the position of resident manager of the San Francisco office of the Earle C. Anthony Co., Reo distributer on the Pacific Coast.

S. A. Fulton, president the Fulton Co., Milwaukee, Wis., has left on his annual Western business trip in the jobbing trade. He will spend most of his time in California.

R. P. Carroll, 1833 Thirty-fourth Street, succeeds G. R. Pennington & Co. as Cleveland district manager for the Troy Wagon Works Co., manufacturer of Troy trailers. This appointment was recently made by Ike S. Byrum, special representative for the Troy company.

J. O. Eaton was elected general manager of the Torbensen Axle Co., Cleveland, Ohio, at a directors' meeting on Oct. 30. Mr. Eaton has been prominent in the truck field for many years as



Wilson is president—of what used to be Sulzberger & Sons, and before that Schwartzchild & Sulzberger, one of the big Chicago packers. But Wilson is president of it, so it is now Wilson & Co. Wilson is progressive, and to prove that American commerce need not live or die at the behest of the railroads he recently sent one of his many trucks across country from Chicago to New York, escorted by a fleet of Salesmen's Fords, all painted the rich yellow which has always been the trade color of this concern. Here is the truck, an Autocar, drawn up in front of the City Hall in New York City

treasurer of the Torbensen company, and is one of those responsible for the great growth of the internal-gear drive in this country.

E. J. Watkins has been appointed works manager of the George Automatic Roller Bearing Co., Cincinnati, Ohio. He was formerly assistant general superintendent of the Dayton Metal Products Co., Dayton, Ohio.

C. L. Lane, who has been secretary of the U. S. Light & Heat Co., Niagara Falls, N. Y., at a recent meeting of the board of directors was elected vice-president.

A. E. Winckler, formerly chief engineer of the motor car department of the J. I. Case T. M. Co., Racine, Wis., has become chief engineer of the Pittsburgh Model Engine Co., Pittsburgh, Pa.

Chester H. Ricker, consulting engineer, has been made president of the Ricker Oil Co., Indianapolis, Ind., recently incorporated. Associated with Mr. Ricker are S. H. Pennfield, vice-president of the Sakusvyrt Wheel & Mfg. Co., Jamestown, N. Y., and president of the Peru Auto Parts Mfg. Co., Peru, Ind., as vice-president, and Robert V. Denham of Indianapolis as treasurer.

Charles F. U. Kelly has sold his interest in the Kelly-Field Co., selling company for the Lee Tire & Rubber Co., Conshohocken, Pa. Mr. Kelly was formerly president of the concern and Harry E. Field vice-president and treasurer. Mr. Field now becomes president.

Advertising Placed via Aeroplane, to the extent of a contract for 50,000 agate lines, was recently received by the *New York Times* from the Mahin Advertising Co., Chicago, for the B. F. Goodrich Co., Akron, Ohio. The contract, along with letters to President Wilson, Mayor Mitchel of New York, Thomas A. Edison, Major-Gen. Leonard Wood, U. S. A., and the *Deutschland*, was in the first aerial United States mail dispatched from Chicago to New York City. Victor Carlstrom in a Curtiss biplane made the flight, as the newspapers everywhere have reported.

Metz Co., Waltham, Mass., has appointed H. G. Spangler, with salesrooms on Newbury Street, Boston, Mass., agent for its line.



which the Adams has awarded. These trucks are mounted on the standard Brockway chassis, fitted with an unusual type of the height of the bodies it is necessary to ship them dismounted from the chassis, so that a standard box car must be used for outfit. The bodies were built to Adams specification in the Brockway body shop. The trucks are to be placed in service have the first two fleets ordered and the fleet above shown is in New York City

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Guaranty Credit Truck Sales Plan

Dealer Gets Full Price and Makes No Collections

NEW YORK CITY, Nov. 6—A time-payment plan for truck sales has just been adopted by the Guaranty Securities Corp., which about a year ago entered the field to finance the sale of passenger cars by dealers. The new plan is similar to the passenger-car plan, but the percentage of cash demanded is not so great because the truck is strictly a necessity and pays for itself.

The status of the Guaranty business may be surmised from its statement that since Jan. 1 it has financed $18,000,000 of passenger-car business. The truck plan has been in operation but a few days.

For a general understanding of the plan it may be stated that when the dealer sells a truck he collects 25 per cent cash from the customer and is paid nearly all the balance by the Guaranty corporation, which collects from the truck buyer through notes. For handling and for adequate insurance a Guaranty charge is made and is paid by the truck buyer. A small part of the sales price of the truck is retained by the Guaranty corporation until the buyer's notes are all paid, but on his deferred payment the dealer gets the prevailing rate of interest.

When a dealer sells a truck of which the f.o.b. factory list is $1,200, the dealer adds freight and the Guaranty charge in arriving at the buyer's delivered price. This buyer's delivered price is the basis of figuring. It is as shown in the plan outlined in the table above.

Several items in the plan may require explanation, as may also some of the steps.

Delivered Price to the truck buyer consists of the list price of the truck, including body and chassis, the freight from the factory to the dealer and the Guaranty charge. If the truck is an electric the delivered price may include the battery, provided the Guaranty corporation approves of the make of battery. This in effect, means that the battery may be included if it is supplied with the truck as shipped from the factory.

Guaranty Charges are approximately 3 per cent, but for convenience in figuring the prices of trucks have been graded in units of $250 and a flat price arrived at for each class, as is shown by the table of charges.

There are two charges, Charge A and Charge B. Charge A applies to all trucks below $1,500 and Charge B must be applied to all above $1,500. Charge B may be applied to those below $1,500. Charge B is the addition of a flat $30.50 to Charge A to cover collision insurance, and in case the service is such that collision is at all probable the dealer may insist upon the buyer paying Charge B where Charge A might otherwise prevail.

Above $1,500 the Charge B is 5 per cent of the delivered price.

These two charges are made because the collision risk is considered greater on the heavier trucks. Rather than base the charge on weights it was deemed more satisfactory to base the dividing line on price, the corporation believing that $1,500 is a good mark between heavy and lighter vehicles.

In case trucks are going into such a rush-and-hurry service as mail delivery, and if the price is below $1,500, the collision risk is greater, and in that case Charge B would apply below $1,500.

Charge A, as does Charge B, includes the usual fire and theft insurance and covers the cost of handling the deal. The insurance becomes effective as soon as the contract is signed and the truck delivered.

The dealer determines whether Charge A or B is to be made.

In case the dealer takes a car or truck in trade the allowance made must be included in the 25 per cent cash payment that he secures when the new truck is delivered. The Guaranty corporation will not finance the sale of used trucks.

If a buyer wishes he may pay more than 25 per cent down and may make the term of payment less than 1 year—but not more. Dealers are encouraged to get as much down as possible and as short a payment term as possible.

The interest on the notes and the deferred certificate must not exceed the prevailing legal rate. In most states this is 6 per cent, wherefore 6 per cent has been used in the table at the beginning of this story.

After the dealer has secured the 25 per cent cash payment he enters into a conditional sale contract with the buyer. This form is laid out in a very simple way. Under each blank space to be filled in is a small number. On the first page of the contract is told what these numbers mean, so that the dealer may always know just how to make out the contract.

Having the contract and note signed, the dealer forwards them to the Guaranty Securities Corp. and in a few days receives 90 per cent of the face of the note in cash. He then has 25 per cent of the whole and 90 per cent of the 75 per cent balance, which amounts to 92½ per cent of the whole price of the truck, including freight.

For the remaining 7½ per cent the dealer has to wait until the buyer makes the last payment; but this is represented by a deferred certificate, upon which he receives interest at the same rate the note itself carries.

The dealer has nothing whatever to do with making collections, and the buyer deals only with the securities corporation. Local banks are not involved.

One other little job the dealer has to do is have the buyer fill out a purchaser's statement. Statement A is used in case the buyer is worth more than $5,000 and Statement B if he is worth less.

Matters are still further simplified for the dealer by the attachment to the contracts, which are in duplicate, of a printed letter form. This is filled out by the dealer and mailed, with the note and contract, to the Guaranty corporation.

Guaranty Plan for Selling Trucks on Time

Illustrating by a truck listing at $1,200 and on which the freight is $44.50. The interest rate is assumed to be 6%. The plan is based upon the Delivered Price, which is arrived at as follows:

Factory list price, f.o.b., chassis and body	$1200.00
Freight	44.50
Price the dealer must get for himself	1244.50
Guaranty Securities Corporation's charge	67.50
CUSTOMER'S DELIVERED PRICE. What the buyer must pay	1312.00

CHARGE A

May apply up to $1,500 Job. Includes incidentals and usual fire and theft insurance for one full year.

CHARGE B

May apply up to $1,500 Job—Required on trucks selling for more than $1,500. Includes incidentals and usual fire, theft and collision insurance for one full year.

GUARANTY CHARGES

$14.50	On all trucks between	$500	and less	$45.00
22.00	" " "	501	"	$750	52.50
29.50	" " "	751	"	1,000	60.00
37.00	" " "	1,001	"	1,250	67.50
44.50	" " "	1,251	"	1,500	75.00
Must pay CHARGE B on all trucks		1,501 or more		5% of delivered price	

THE BUYER'S PART

1—Pays cash 25 per cent of $1,312	$328.00
2—Signs conditional sale contract and note for balance of $984.00	
3—Pays $82 monthly for 1 year	984.00
Delivered price of truck	$1,312.00
4—Also pays interest on the note	31.98
Buyer actually pays for truck	$1,343.98
Price of truck plus freight	1,244.50
Cost of accommodation	99.48
Cost of accommodation per month	8.29
" " " per week	1.91
" " " per day	.33

THE DEALER'S PART

1—Collects 25 per cent of $1,312 in cash, which includes the $67.50 that goes to the Guaranty Securities Corporation	$328.00
2—Sends to Guaranty Securities Corporation note for the balance of 75 per cent	984.00
3—Receives at once 90 per cent of face of note, deducting $67.50, which was received by dealer for Guaranty Securities Corporation's charge	818.10
4—Dealer has received in cash at once	$1,146.10
5—Receives Deferred Certificate for 10 per cent of $984, bearing interest at 6 per cent $98.40	
6—When last payment is made he gets the $98.40	98.40
List price of truck plus freight	$1,244.50
7—Dealer also receives 6 per cent interest on the $98.40 Deferred Certificate	5.90
Dealer actually receives for truck	$1,250.40

GUARANTY SECURITIES CORPORATION'S PART

1—Accepts from dealer the buyer's note for	$984.00
2—Advances to dealer at once 90 per cent of $984 minus the $67.50 Guaranty charge	818.10
3—Collects $984 from buyer in 12 monthly payments.	
4—When last payment is collected pays dealer Deferred Certificate of $98.40, plus interest at 6 per cent	104.30
5—Company realizes as follows:	
a—Guaranty charge	$67.50
b—Interest from buyer	31.98
Total	$99.48

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ERRATA

THE best of us err, and the next best thing to avoiding errors is to correct those we make quickly and effectively. In the Annual Forecast issue, Nov. 1, 1916, some errors crept in despite the most cautious editing. Some of these were the fault of the staff; others of manufacturers who unintentionally submitted erroneous information.

These two pages have been prepared to enable readers to make the corrections in their Forecast issues, so that they will be 100 per cent accurate for reference throughout the year, instead of the usual method of calling attention to the errors through the columns of the magazine and running the risk of their being forgotten.

This page may be torn from the paper along the dotted line without injury to the rest of the issue, since it is complete without this page, and the chart and table reproduced on the back may be pasted over the erroneous ones in the last issue.

With pen and ink the following corrections may be made:

Page 38:

Wilcox prices should be as follows:

Wilcox	S	2,000-lb.	$1,750
Wilcox	R	3,000-lb.	2,150
Wilcox	Q	4,000-lb.	2,500
Wilcox	P	7,000-lb.	3,000

Zeitler & Lamson trucks have Bosch magnetos and starting and lighting systems as sole equipment, so that asterisks should be erased.

Page 24:

Second column, "Trucks of 1-Ton Capacity."

Wilcox price, $1,750.

Page 25:

First column, "Trucks of 1½-Ton Capacity."

Wilcox price should be $2,150.

Second column, "Trucks of 2-Ton Capacity."

Wilcox price should be $2,500.

Page 26:

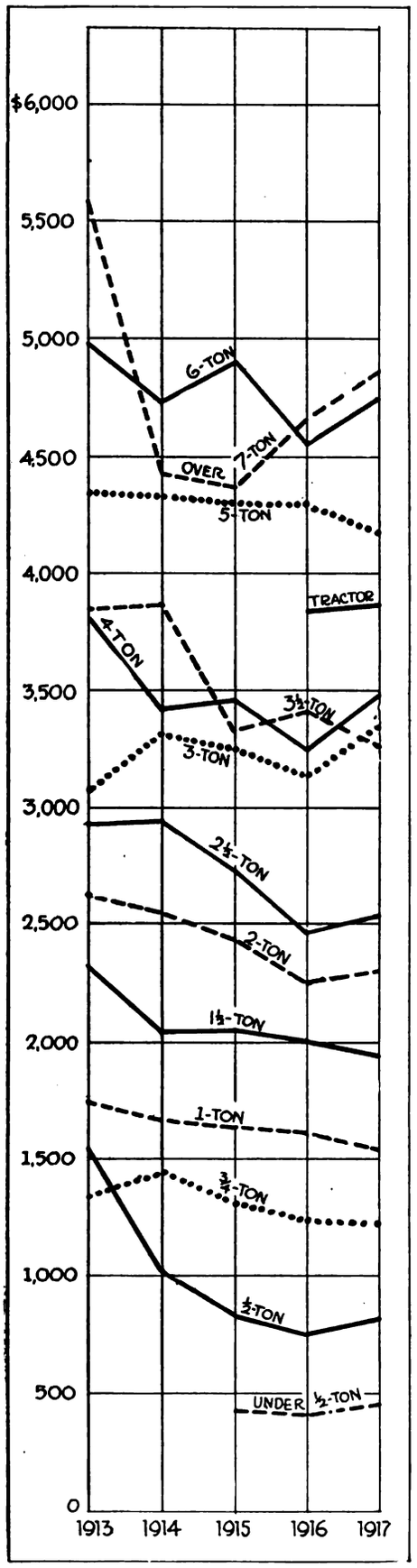
Second column, "Trucks of 3½-Ton Capacity (Continued)."

Wilcox price should be $3,000.

Page 28:

Brockway, Model K-2, rear tires 36 x 7.

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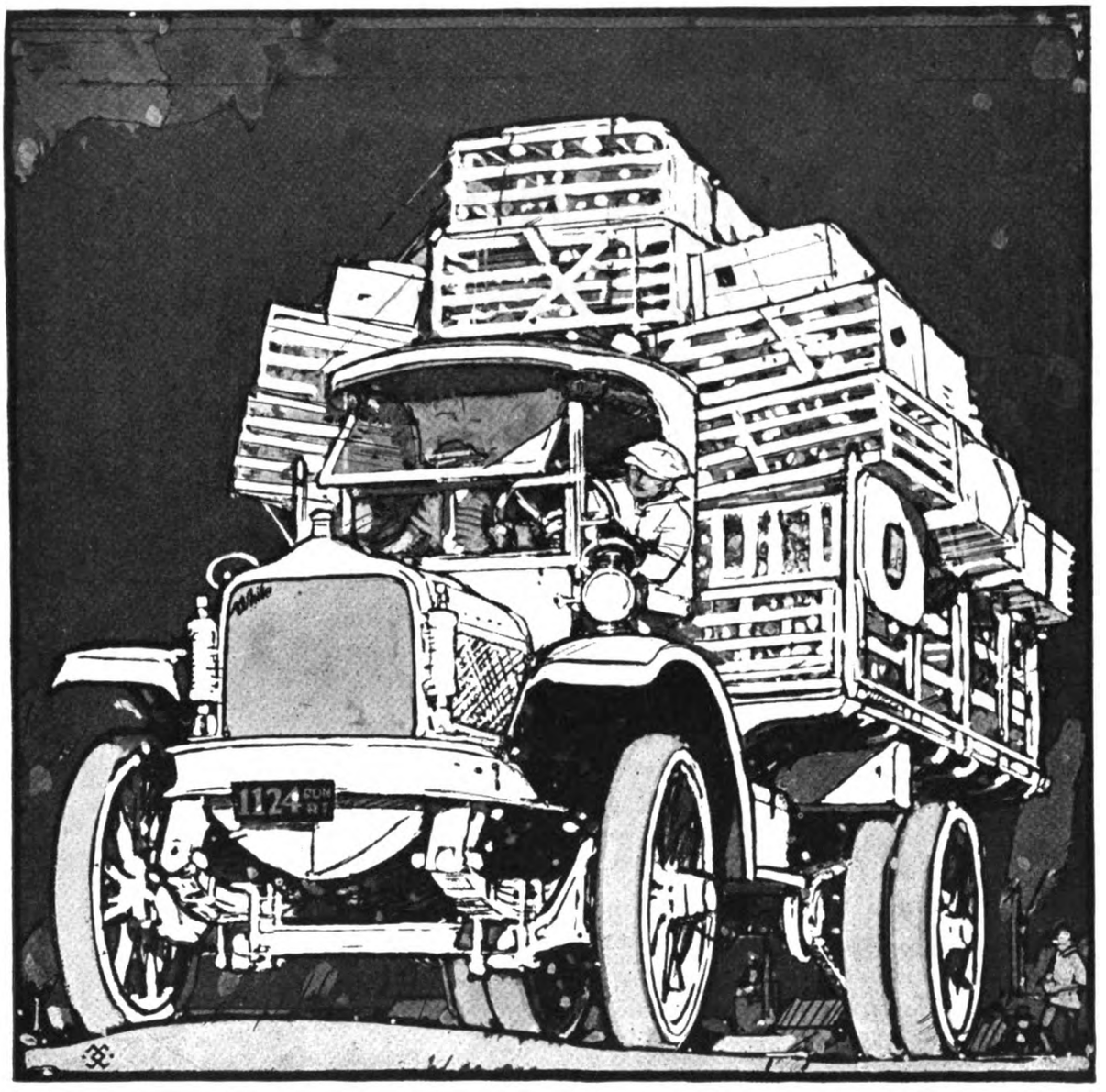
Cut this chart out and paste it over the one on page 11 of your November 1, 1916, issue of THE COMMERCIAL VEHICLE

The Trend in List Prices

Tons	AVERAGE PRICES						1917 GAIN-LOSS		4 YEARS' GAIN-LOSS	
	1913	1914	1915	1916	1917		Amount	Per Cent	Amount	Per Cent
Less than ½	.....	.....	$439.50	$429.17	$503.33		+$74.16	+16.8	.....	.....
½	$1,527.77	$1,002.00	862.77	766.43	760.59		− 5.84	− .7	−$767.18	−50.2
¾	1,358.33	1,453.16	1,328.99	1,234.00	1,217.73		− 20.84	− 1.7	− 145.15	−18.0
1	1,759.39	1,690.55	1,660.98	1,642.17	1,521.50		−120.67	− 7.3	− 237.89	−13.5
1½	2,345.53	2,034.33	2,057.54	2,004.32	1,930.34		− 53.98	− 2.7	− 395.19	−16.8
2	2,635.36	2,565.48	2,433.27	2,287.93	2,302.91		+ 14.98	+ .6	− 332.45	−12.6
2½	2,950.00	2,957.14	2,740.00	2,481.21	2,526.60		+ 45.39	+ 1.8	− 423.40	−14.4
3	3,095.88	3,323.33	3,271.32	3,147.73	3,356.21		+208.48	+ 6.6	+ 260.33	+11.9
3½	3,837.50	3,437.50	3,489.77	3,276.43	3,258.33		− 18.10	− .5	− 579.17	−15.0
4	3,841.66	3,877.77	3,337.50	3,417.50	3,488.63		+ 71.13	+ 2.1	− 353.03	− 9.8
5 and 5½	4,366.66	4,350.00	4,312.90	4,311.36	4,181.08		−130.28	− 3.0	− 185.58	− 4.2
6 and 6½	4,970.00	4,743.75	4,915.38	4,555.55	4,725.00		+169.45	+ 3.7	− 245.00	− 4.9
7 and over	5,600.00	4,420.00	4,394.44	4,687.50	4,825.00		+137.50	+ 2.9	− 775.00	−13.9
Tractors	.....	.....	.....	3,825.00	3,862.50		+ 37.50	+ 1.0	.....	.....

Cut out this table and paste it over the one appearing on page 9 of your November 1, 1916, issue of THE COMMERCIAL VEHICLE

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WHITE TRUCKS

A SUPERIOR product is not the whole advantage in dealing with The White Company. Its wide and varied experience, covering the special transportation problems of thousands of motor truck users, is an asset second in importance only to the product itself.

There are more White Trucks put into service each year than trucks of any other make, and furthermore, this predominance is nation-wide, among all classes of users.

THE WHITE COMPANY
CLEVELAND

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Hess-Bright Not Controlled By Outsiders

To correct misleading rumors and statements The Hess-Bright Manufacturing Company makes the following announcement:

A group of bankers including Frank A. Vanderlip, Philip W. Henry, Thatcher M. Brown, and Franklin B. Kirkbride, of New York, and Marcus Wallenberg, of Stockholm, have recently acquired from the American group of stockholders, a controlling interest in the shares of The Hess-Bright Manufacturing Company. This group of bankers owns also a substantial interest in the S. K. F. Ball Bearing Company of Hartford, Connecticut.

The two companies will be operated quite independently of each other. The former policy of The Hess-Bright Manufacturing Company will be continued except that its manufacturing facilities will be increased somewhat more rapidly to meet the constantly growing demand for its product. B. D. Gray, who retains his former stock holdings, will continue to manage the business as President. F. E. Bright retires from active participation in the Company's affairs, but remains identified with the Company as Chairman of the Board. Aside from these two changes, the organization remains as before.

The Directors are:

F. E. Bright, Chairman;

B. D. Gray, President of The Hess-Bright Manufacturing Company;

Willard Parker Butler, of New York City;

Arthur V. Morton, Vice-President of the Pennsylvania Company for Insurance on Lives and Granting Annuities, of Philadelphia;

Paul von Gontard, Managing Director of the Deutsche Waffen-und Munitions Fabriken, Berlin, Germany.

Philadelphia, Pa.
Nov. 14, 1916.

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STUDEBAKER

Commercial Cars

A National Opportunity for Progressive Dealers



Half-ton Panel Delivery Car $875



Half-ton Open Express $850



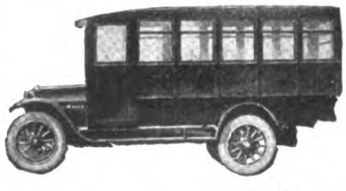
Half-ton Station Wagon $875



One-ton Open Express $1200



One-ton Stake Body $1250



16 Passenger 'Bus . $1400

All Prices F. O. B. Detroit

It is impossible to overestimate the opportunities that the Studebaker SERIES 17 line of Commercial Cars offers to the progressive dealer.

It is a NATIONAL opportunity that is widening daily. And the surface has just been scratched. ALL the commercial cars now in use do not represent one-half of one per cent of the possibilities that lie before the men who get into this side of the industry early.

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This line comprises 6 models—3 of the half-ton size and 3 new models of ton capacity. Already the half-ton vehicles have won a national popularity. And not only have they proved up in use, but they offer the biggest dollar-for-dollar VALUES in the market.

No progressive Dealer who is seeking to widen and fortify his business can overlook the opportunity this line offers. And we urge every dealer to write at once for complete information.

STUDEBAKER

South Bend, Ind. Detroit, Mich. Walkerville, Ont.

Address all correspondence to Detroit

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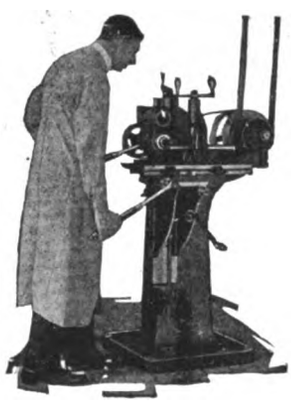
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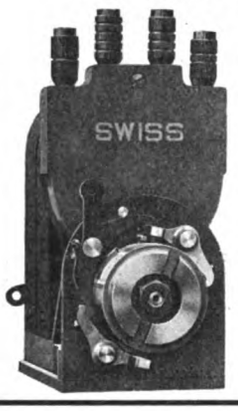
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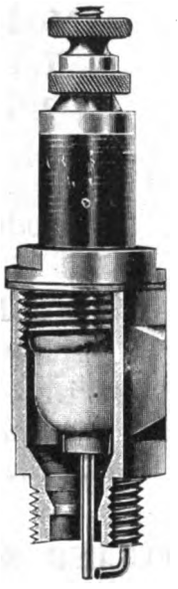
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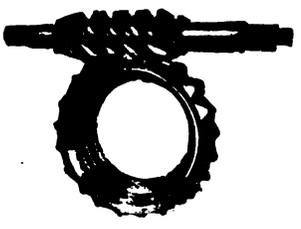
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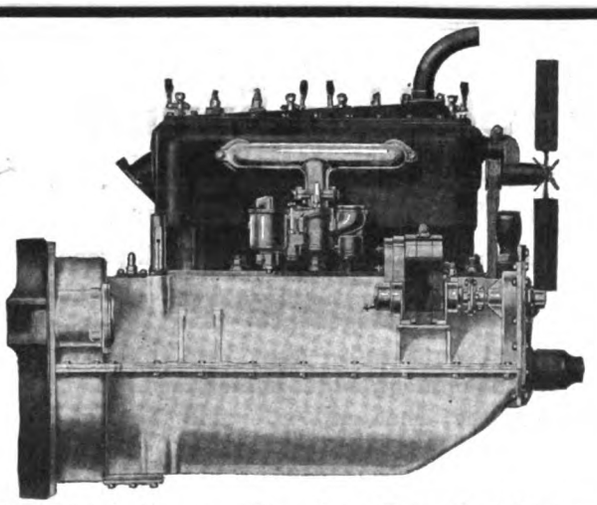
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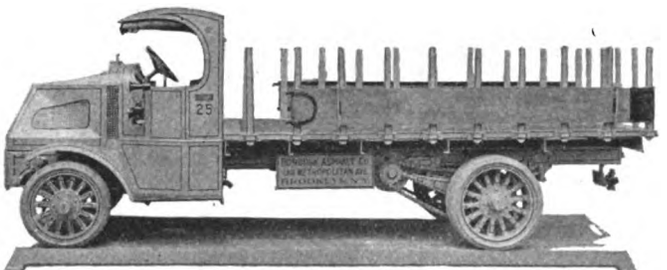
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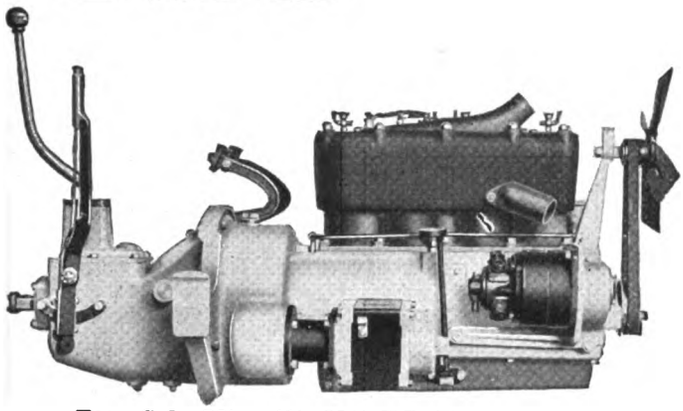
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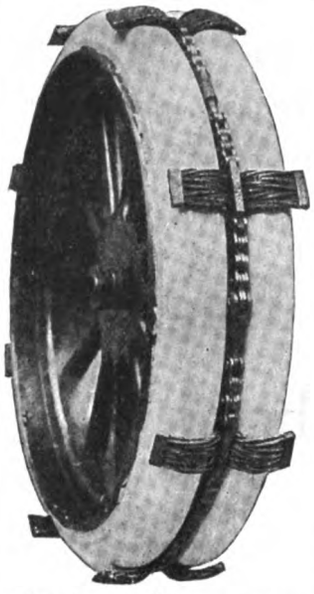
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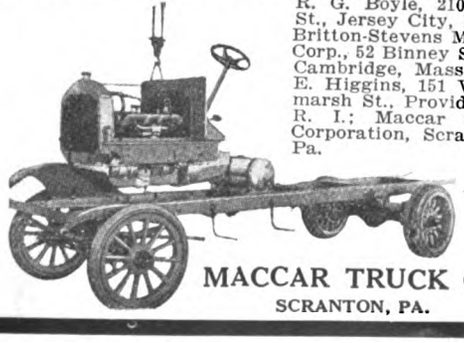
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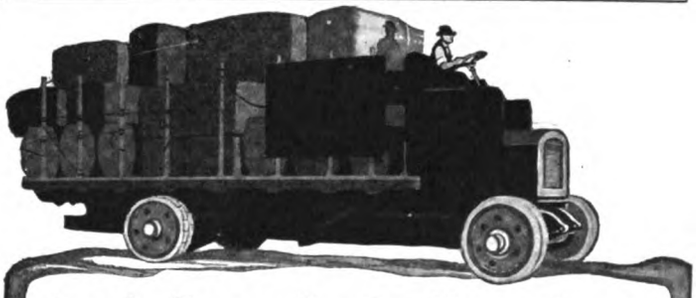
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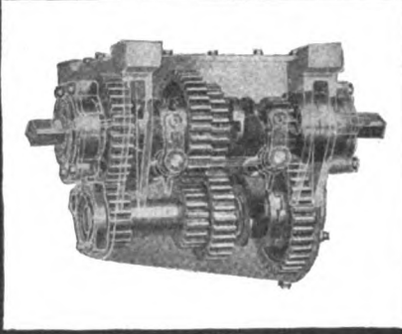
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IF you buy felt washers simply by the price, you can always find some that are lower priced than ours. But if you care for quality, service and perfection, BOOTH'S are the lowest priced washers made.

BOOTH FELT COMPANY, Inc.
440-450 19TH STREET BROOKLYN, N. Y.
116-118 South 5th Avenue Chicago, Ill.

COTTA TRANSMISSIONS



All Gears Always in Mesh

An Assurance of Dependable Service

The Cotta Transmission Co.
Rockford, Ill.

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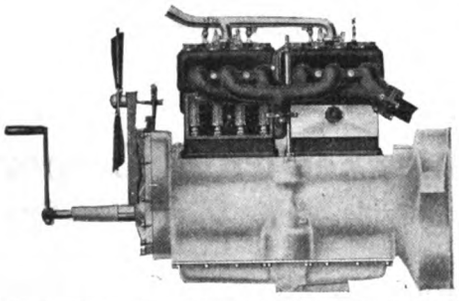
NORTH AMERICAN MOTORS

This is to announce two new models which have been added to the "N. A." line. They are: Model C, developing 20-25 H.P., and Model CX, developing 25-30 H.P. These motors round out a line of power plants for commercial vehicles which are the most thoroughly accessible and simplest truck motors ever designed.

Full information on these new models or on our entire line will be gladly sent.

A Detroit office has been opened at 1325 Dime Savings Bank Building.

NORTH AMERICAN MOTORS COMPANY
Factory: POTTSTOWN, PA.
Detroit Office: 1325 Dime Savings Bank Bldg.



A Gramm-Bernstein Truck Expert on the Ground With You

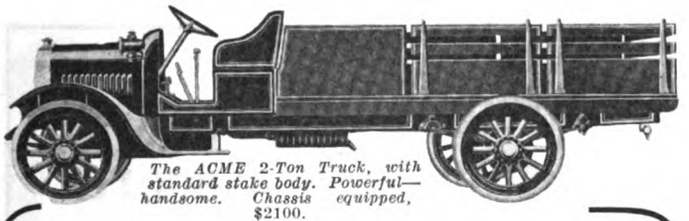
THAT'S one part of the famous Gramm-Bernstein sales policy for Gramm-Bernstein Truck dealers.

Important deals that may demand our experts bring Gramm-Bernstein men right on the ground.

Gramm-Bernstein advertising appears in your local newspapers—brings prospects to *you*. The biggest truck men in the country have joined us through this new proposition. It will interest you—write or wire us. See what the Gramm-Bernstein plan will do for you. It certainly means money to the right man. Get it today!

Gramm-Bernstein Co.
13 Gramm Boulevard
LIMA, OHIO





The ACME 2-Ton Truck, with standard stake body. Powerful—handsome. Chassis equipped, $2100.

Fill Immediate ACME Orders!

DEALERS: Get the quick, profitable business of local truck buyers who know the advantages of ACME Trucks and want them **for early delivery.** The **surest selling features** to meet customers' requirements for from 1-ton to 3-ton capacities.

Clinch the ACME Agency now—and sell **easily,** with **substantial profit.** No large service to render because of fifteen famous "Proved Units" from radiator to tail light. ACMES have oversize dimensions. The 2-ton ACME has powerful 40 H. P. Continental Motor and big capacity—Chassis, equipped $2100.

ACME
THE TRUCK OF PROVED UNITS

Be in a position to accept big business on our One-Ton Truck. Announcement and specifications sent on request. An all-feature worm drive ACME —$1500.

Write for Booklet, "A Business Builder," and Territorial offer today. Or WIRE—

Cadillac Auto Truck Co.
111 Mitchell Street
CADILLAC, MICHIGAN

"Little Giant"



The Power-Bred Truck

MECHANICAL power is bred into the Little Giant Trucks of today—just as strength and endurance were bred into the Percherons of the past. The Little Giant is lively, responsive, like a fine-spirited horse—yet, like a young Mogul Locomotive, it is dependable twenty-four hours in twenty-four. Thousands of Little Giant owners proudly boast—"it never had a tow-rope on it yet."

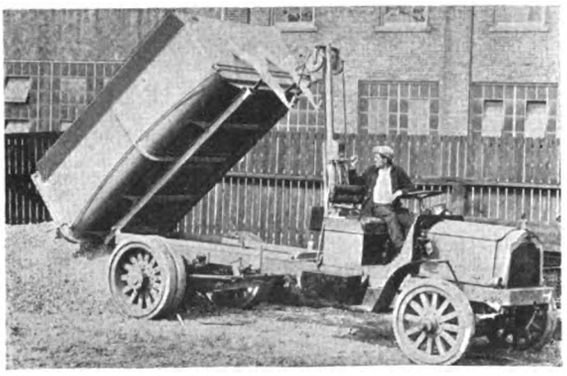
THE "LITTLE GIANT" LINE INCLUDES

Model 15—1-ton Worm Drive
Model H—1-ton Chain Drive
Model H—1½-ton Chain Drive
Model 16—2-ton Worm Drive
Special Bodies for Every Purpose

Agents wanted for desirable territory

CHICAGO PNEUMATIC TOOL COMPANY
1085 Fisher Bldg. CHICAGO — **52 Vanderbilt Ave.** NEW YORK
Branches and Service Stations Everywhere

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"TYPE D"
Heavy Duty Hoist with Standard Coal Dump Body

By Way of
Foreword

preceding an important announcement by the Wood Hydraulic Hoist & Body Company, to be made on or about January 1st, 1917, we strongly urge all parties expecting to place orders for dump body equipment within the next six months to get in touch with us by letter for advance information.

Your prompt action on this suggestion will bring you the particulars by return mail.

Wood Hydraulic Hoist and Body Co.
DETROIT

WOOD HOISTS
WOOD BODIES

Handle Your Time Sales on the

Guaranty Time Payment Plan

GUARANTY PLAN
COMMERCIAL CAR Time Payments

Guaranty Securities Corporation
Equitable Building, New York City

San Francisco
Hobart Building

Montreal
National Trust Company

The Universal Automobile Record Book

THE object of THE UNIVERSAL AUTO RECORD BOOK is for the Owners of automobiles to keep an accurate account of all costs pertaining to the operation of their machines in a simple, compact and accurate form.
Through THE UNIVERSAL AUTO RECORD BOOK, if the record is correctly kept, the exact expense of all items can be easily arrived at and any leakage in expenses be corrected.
Through THE UNIVERSAL AUTO RECORD BOOK provision is made for the separate listing of different items of expense, also records of tire mileage, motor trips, etc.
The convenience of keeping the record of the mileage is well worth the price of the book.
THE UNIVERSAL AUTO RECORD BOOK can be carried in a convenient place in the car, either in a door pocket or under the seat or will easily fit into the coat pocket on account of the fact that the book is only 5¼" wide and only 7¾" deep.
There can be no question but that the keeping of a Record Book along the above lines would prove not only of real interest to every car owner, but will also add pleasure to the operation of the machine, and at the same time will afford a saving in the cost of operation.
THE UNIVERSAL AUTOMOBILE RECORD BOOK will be sent postpaid to any address upon receipt of 50c.

COMMERCIAL VEHICLE
239 West 39th St., New York

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BROWN-LIPE

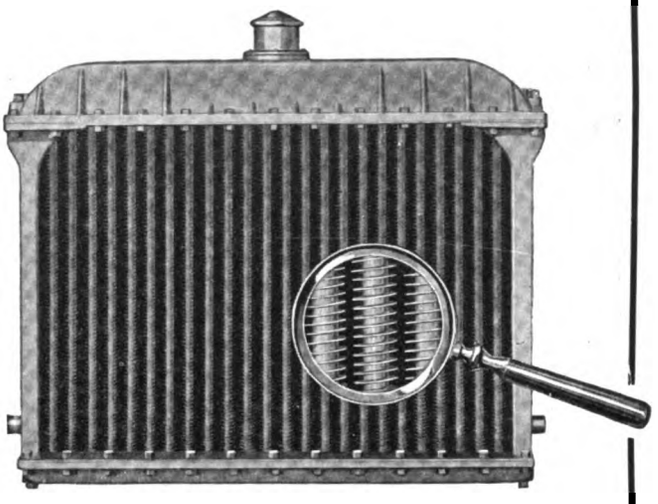
transmissions and differentials represent the maximum from a standpoint of efficiency and durability.

BROWN-LIPE GEAR CO.
SYRACUSE, N. Y., U. S. A.

BROWN-LIPE CHAPIN CO.
Differentials Transmissions

NEW YORK—Thos. J. Wetzel, 29 West 42d St.
SAN FRANCISCO—A. H. Coates, 444 Market St.
CHICAGO—K. Franklin Peterson, 122 So. Michigan Ave.
DETROIT—L. D. Bolton, 2215 Dime Savings Bank Bldg.
Foreign Agent, Benjamin Whittaker, 2, Norfolk Street, Strand, London, W. C.

Seamless Copper Helical Tube Cooling Sections



Are Guaranteed for the Life of the Motor on Which They are Installed

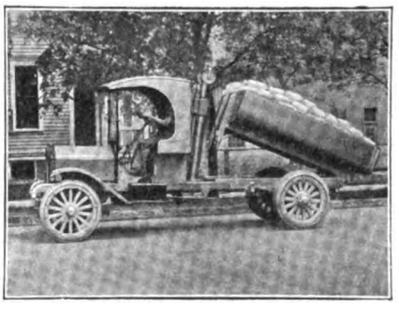
Helical Tube Construction is Accepted as the Best by the Leading Truck Makers of America

Manufactured only by

ROME-TURNEY RADIATOR CO.
ROME, NEW YORK

Stegeman

SIX-CYLINDER
SELF-STARTER
WORM-DRIVE
TRUCKS



The most for your money—that's what we offer. A 6-cylinder Motor, Electric-Starter and Electric-Lights are furnished on our truck without extra charge. On any other machine they would cost $300 extra.

Ours is not the cheapest truck on the market, but it is certainly a low-priced line, quality considered.

WE WANT RELIABLE AGENTS

STEGEMAN MOTOR CAR CO.
Milwaukee, Wisconsin

United States 'Solid Truck' Tires



Truck Tire Efficiency

Our new, secret process compound, vulcanized under a pressure of 1,600,000 pounds (almost four times the pressure used to vulcanize ordinary truck tires) has more vitality, rugged strength and durability than any other compound manufactured.

For this reason, United States Solid Truck Tires are the strongest and most durable now on the market.

United States Tire Company
1790 Broadway, New York City

UNITED STATES RUBBER COMPANY
US
RUBBER SYSTEM
AND ASSOCIATED COMPANIES

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Standard

MADE IN DETROIT USA

Motor Trucks

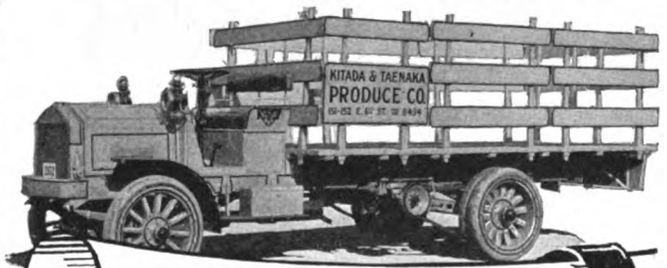
Startled the Motor Truck Industry By a Unique Sales Plan

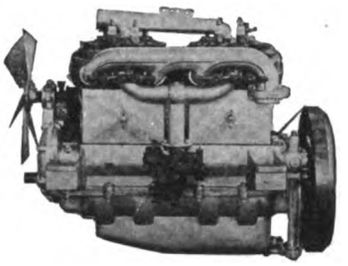
First of all, the Standard is an unusual truck. It is a powerful combination of many of the world's best-known units—the Continental Motor; Timken Axles; Timken Bearings; Brown-Lipe Gears, and other well-known standard parts.

The Standard Motor Truck is sold in an unusual way. Any responsible person can be the agent for the Standard, with absolutely *no investment—no deposit* and *no contract.*

Write for details of this plan. *No obligation.*

STANDARD MOTOR TRUCK CO., 315-327 Bellevue Ave. Detroit, Mich.





Beaver Motors Make Their Way By The Way They Are Made

BEAVER MOTORS are made by truck motor specialists. The concentrated experience of engineers of international reputation is embodied in their construction.

BEAVER TRUCK MOTORS are made by men who make nothing but motors—who, by doing the same thing over and over have become masters in perfection. That is why we can make truck motors better, quicker, and at less cost than the truck manufacturer himself.

We make truck motors of all sizes, for all requirements. No matter whether you are building a 1,500 pound light delivery wagon or a 5-ton truck, we can meet your demands for power, economy and dependability.

Do not determine on a motor for your truck till you have sent us your specifications.

BEAVER MFG. COMPANY

Milwaukee Wisconsin

Thermoid

HYDRAULIC COMPRESSED Brake Lining—100%

An Overturned Truck

reflects discredit on both owner and maker. However the accident may have happened, many people say: "Careless driver," or "Irresponsible owner," or "Unreliable maker."

Thermoid Brake Lining won't prevent all kinds of accidents, but it most positively will prevent all those that come from slipping brakes—brakes that fail through their lining. Here is a big source of costly accidents eliminated at trifling expense.

Thermoid will grip with friction power even when worn thin as paper. It is one single solid mass, made so by hydraulic compression. By weight it shows 50% more material than any other brake lining. That material is long-fibre Canadian asbestos spun on brass wire and impregnated with a friction compound which is also impervious to heat, water, oil, gasoline or dirt.



Cannot be burned out nor affected by oil, heat, water, gasoline, dirt.

Your Guarantee

Thermoid Brake Lining is absolutely guaranteed to give more satisfactory results and to outwear any other lining manufactured. Not affected by heat, oil, water, gasoline or dirt.

Thermoid Rubber Company

Trenton, New Jersey

Makers of a full line of automobile accessories and mechanical rubber goods.

DON'T

throw your old bearings away just because they are worn or broken.

We regrind the raceways (without drawing the temper) insert new balls and retainer AT about one-fifth the cost of a new bearing.

Any broken or worn bearing can be exchanged at any of our service stations, for reground bearings of any type or make, which are guaranteed equal to new.

These stations also carry complete stocks of New Single Row Annular, Thrust, NEW DOUBLE Row and Radax Bearings.

Write for Catalogue "U" and further information

Ahlberg Bearing Company

2636 Michigan Avenue Chicago, Ill.

BRANCHES

New York, 1790 Broadway
Boston, 93 Massachusetts Ave.
Detroit, 790 Woodward Ave.
Cleveland, 1841 Euclid Ave.
St. Louis, 2831 Locust St.
Los Angeles, 325 W. Pico St.
Minneapolis, 926 Marquette Ave.

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DIAMOND T

TRUCKS

Diamond T Service is as thoroughly built into our ¾-ton trucks, the smallest of the line, as it is in our 3½ ton model.

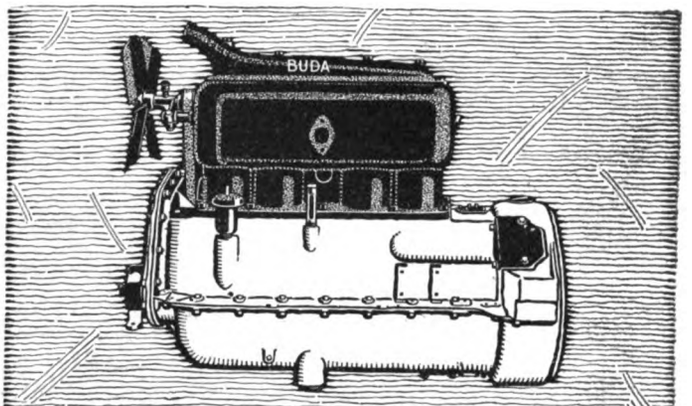
Its low cost is made possible only by its wide popularity which has enabled us to produce this model in enormous quantities. There has been no cheapening of quality or inferior workmanship permitted in its design or construction.

For a thousand uses it is the most satisfactory and economical delivery vehicle ever marketed. With a body suited to your requirements, it will improve your delivery service while lessening your operation expense.

Write to-day for catalog.

Diamond T Motor Car Co., Chicago, Ill.





Buda Motor, "the Fine Product of 35 Earnest Years," is acknowledged the standard in its field. Its unequalled record is the result of the Buda Company's 35-year policy, "Performance, not Price."

BUDA TRUCK MOTOR

The presence of the Buda Motor in truck or pleasure car is a guarantee of quality in the vehicle through the strength of the Buda Company behind it. But, still more is it a guarantee because it is a piece of *fine machinery*, which *does its work* superbly—day after day, year after year. You will find it in many of America's greatest trucks.

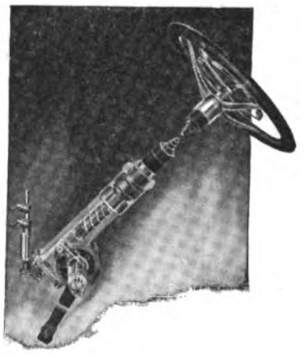
THE BUDA COMPANY — HARVEY CHICAGO SUBURB ILL.

THE BUDA COMPANY BUDA MOTOR "The part to buy the car by" ESTABLISHED 1881

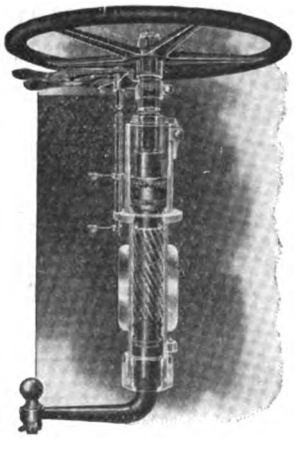
STANDARD

on good motor truck construction

INVESTIGATE



Fore and Aft Steering Gears Cross Type



Enormous bearing surfaces

Perfect Lubrication

Best material thruout

Finest workmanship

Ross Gear & Tool Co.

750 Heath Street

Lafayette Indiana

PIERCE

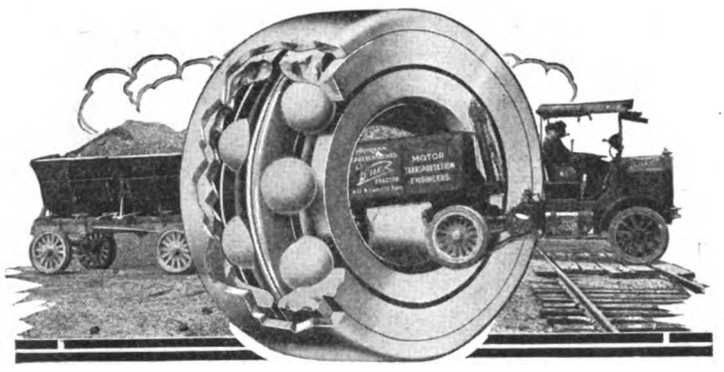
Leading Manufacturers advertise, as proof of their leadership, the presence of PIERCE GOVERNORS on their trucks.

The

PIERCE GOVERNOR COMPANY

Anderson Indiana

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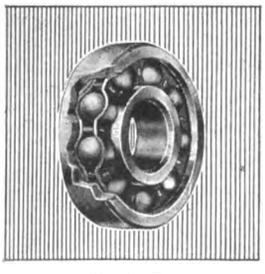


In the Knox heavy duty Tractor, the transmission shafts and the differential assembly are supported and the thrust of the bevel driving pinion is taken by

NEW DEPARTURE BALL BEARINGS

American Made for American Trade

In the selection of New Departures for these important points, where frictional resistance must be reduced to a minimum and where strength and dependability are all important, the builders of this tractor were influenced by their knowledge of New Departure quality, adaptability and service—the three factors that have appealed to so many other manufacturers and responsible for the use of New Departure Ball Bearings in such a large majority of American-made motor cars of every type and size.



Single Row

Every manufacturer, dealer in, or prospective buyer of Motor Trucks, should read the book—"New Departure Ball Bearings in Commercial Applications." Send for a copy.

THE NEW DEPARTURE MFG. CO.

BRISTOL, CONN., U. S. A.

Conrad Patent Licensee

Western Branch: 818-20 Ford Bldg., Detroit.
Distributors in Trade Centers Throughout the United States.
British Agents: Brown Bros., Ltd., London, E. C.
For Continental Europe: Jacob Holst, Copenhagen.



The Star Union Brewing Co., of Peru, Ill., is duplicating—

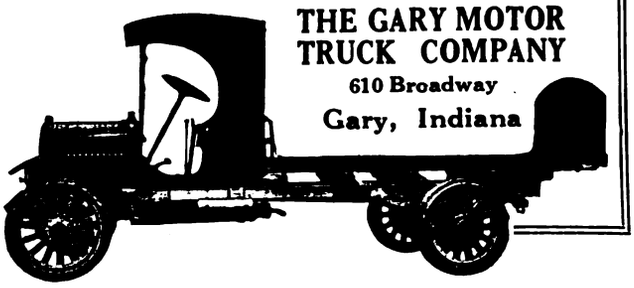
The Worm Drive GARY TRUCK

—now on duty in Peru, for its Peoria branch.

It's the same story we've had to tell ever since GARY Trucks first became established in the field—50% of our business is repeat orders from GARY owners—the best recommendation for Gary service.
Every refinement known to increase efficiency is incorporated in the GARY Truck, by expert workmen.
The result is 4 GARY models, 4 capacities at 4 prices that are right—ready to handle any load you want to move—and to give satisfaction that will make you come back for more.
Try one GARY in service with any assortment of best known trucks. Your fleet will eventually be a GARY fleet.
Dealers—Reorders and generous new business make GARY the logical truck for dealers.

Write or wire for details

THE GARY MOTOR TRUCK COMPANY
610 Broadway
Gary, Indiana

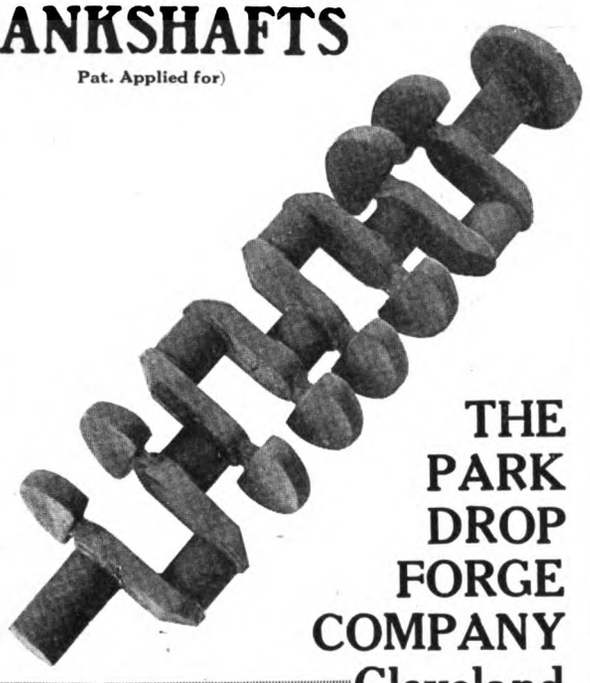


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PARK

COUNTERBALANCED CRANKSHAFTS

Pat. Applied for)



THE PARK DROP FORGE COMPANY
Cleveland

GMC
GENERAL MOTORS COMPANY
TRUCKS

This trade mark stands for a complete line of trucks *built in worm and chain drive* to meet the varied demands of city and country work—a truck to fit your business.

Send for catalogues today

GENERAL MOTORS TRUCK COMPANY
One of the Units of General Motors Co.
Pontiac, Michigan

Branches and Distributors in principal cities (84)



Saving money on coal deliveries

The Metropolitan Coal Company of Boston and its subsidiary branches operate 20 Mack Trucks. Every one is run on a "no-waste" basis. Every one is equipped with the

DREADNAUGHT *Indestructible* Hub Odometer

TRADE-MARK

This simple, reliable hub odometer gives an accurate mileage record every day. The leaks are found and stopped.

The Dreadnaught is the only hub odometer that is guaranteed indestructible even in collision. If you break it, we'll replace it free.

The figures are always right-side up. Grease and dust can't get at them—always easy to read.

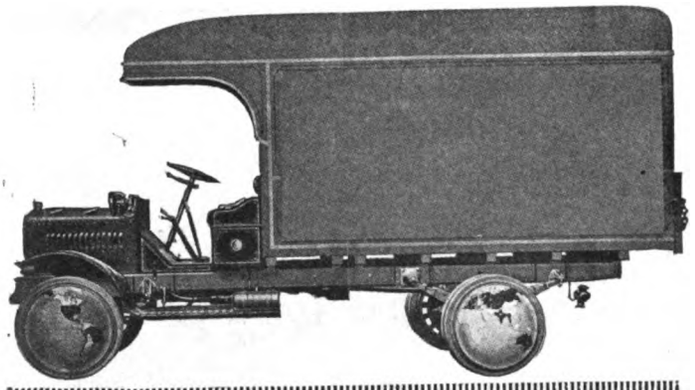


If you have one truck or one hundred, you need the Dreadnaught. Write for our booklet now. It also tells of the Recordograf, an accurate tape-recording instrument which shows time truck is going, time standing still, distance travelled, and speed at all times.

AMERICAN TAXIMETER COMPANY
Mfrs. of Jones & Popp Taximeters
1765 Broadway, New York City

SERVICE STATIONS IN THE FOLLOWING CITIES:
San Francisco New Orleans Washington Chicago Detroit Philadelphia Seattle Boston Pittsburgh St. Louis

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WICHITA TRUCKS

Dependability Plus Extensive Service

ARE YOU THE DEALER

who can put into your salesmanship WICHITA Energy and Spirit and back up your selling accomplishments with WICHITA Service?

If you are such a dealer, we have an interesting selling plan that you will not want to miss considering.

The faithful co-operation of our factory organization will give you encouraging help.

We want live dealers NOW—Men who will interest concerns in our heavy-duty trucks, and then to not let up on them until they sell them.

Request us to immediately submit our plans.

WICHITA FALLS MOTOR COMPANY

Arthur Boulevard, Wichita Falls, Texas

G. V. ELECTRIC TRUCKS

SIX MODELS: 1,000 POUNDS TO 5 TONS



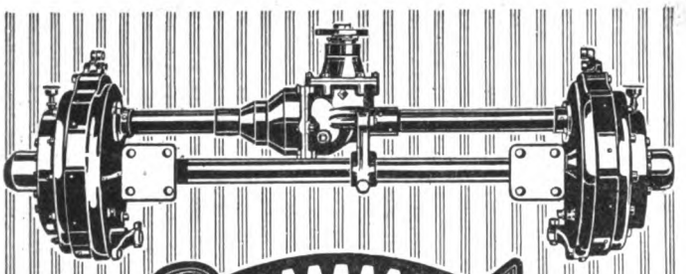
Nearly 5,000 in use
Catalog on request

General Vehicle Company, Inc.

GENERAL OFFICE AND FACTORY
LONG ISLAND CITY, NEW YORK

NEW YORK::CHICAGO::BOSTON::PHILADELPHIA

1664



Russel

Internal Gear Drive Axles

SELLING trucks these days is not difficult, for the industries of the country are awakening to the advantages of motorized delivery.

Make your sales even easier by using trucks driven by the Russel Internal Gear Drive Axle.

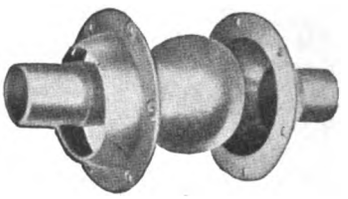
Industrial preparedness demands that the most serviceable, durable and efficient form of truck haulage be adopted by you.

Adopt, therefore, a truck using The Russel Internal Gear Drive Axle

Russel Motor Axle Co., North Detroit

BOSSERT

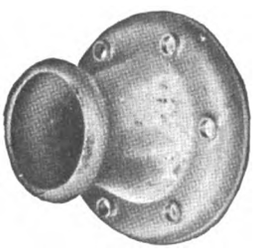
In the most perfect plant that brains, money and experience could devise, we have the men and equipment to produce pressed steel parts in any quantity on comparatively short notice.



We make more than 200 pressed steel parts and you can make your vehicles lighter and at lower cost, without sacrificing strength if you use *pressed steel* spring hangers, running boards, brake drums, etc., instead of malleable iron, steel castings and drop forgings.

"THE BOSSERT WAY"

stands for the prompt delivery of your order filled in accordance with every item of the specifications.

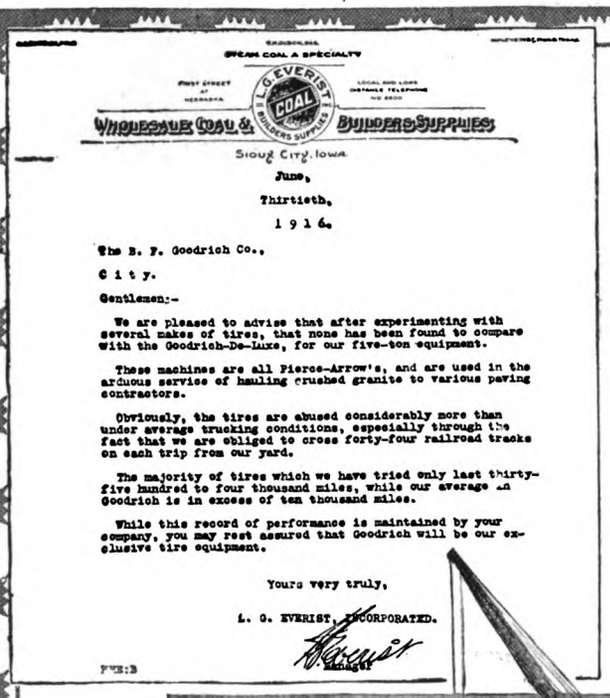


The Bossert Co.

UTICA

N. Y.

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STEAM COAL A SPECIALTY

L. G. EVERIST COAL BUILDERS SUPPLIES

WHOLESALE COAL & BUILDERS SUPPLIES

Sioux City, Iowa.

June, Thirtieth, 1916.

The B. F. Goodrich Co.,

City.

Gentlemen:-

We are pleased to advise that after experimenting with several makes of tires, that none has been found to compare with the Goodrich-De-Luxe, for our five-ton equipment.

These machines are all Pierce-Arrow's, and are used in the arduous service of hauling crushed granite to various paving contractors.

Obviously, the tires are abused considerably more than under average trucking conditions, especially through the fact that we are obliged to cross forty-four railroad tracks on each trip from our yard.

The majority of tires which we have tried only last thirty-five hundred to four thousand miles, while our average on Goodrich is in excess of ten thousand miles.

While this record of performance is maintained by your company, you may rest assured that Goodrich will be our exclusive tire equipment.

Yours very truly,

L. G. EVERIST, INCORPORATED.

Manager

FWH:B

Through with 3500-mile tires since getting excess of 10,000 miles from

GOODRICH DE LUXE TRUCK TIRES

(Made in 5-inch, 6-inch and 7-inch widths)

—Experience of L. G. Everist and hundreds of other large contractors has led them to specify **Goodrich De Luxe** tires as exclusive equipment. This they have done after experimenting with other makes.

—*You* don't need to experiment. Place your faith in the exceptional performance ability of **Goodrich De Luxe**—the tires of extra-volume tread rubber. They wear longer and so cut down truck operating costs.

Write for catalog

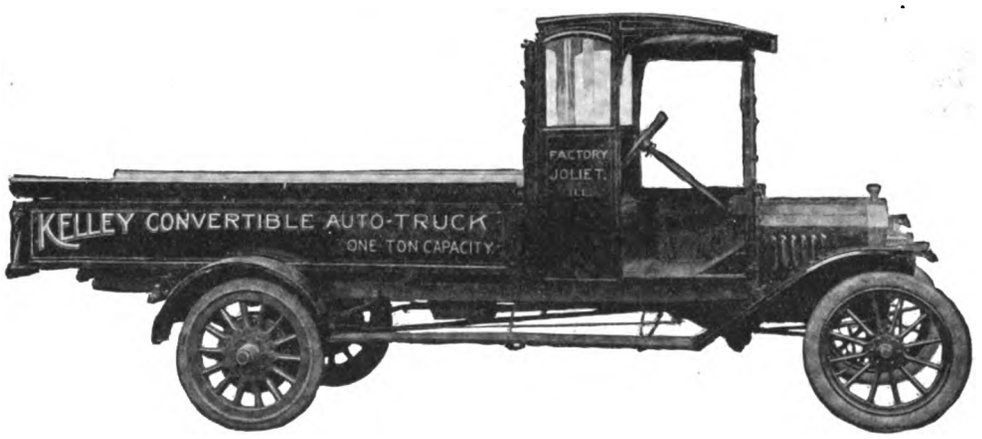
The B. F. Goodrich Co.

Akron, Ohio

Makers of the Celebrated Goodrich Automobile Tires—*"Best in the Long Run"*

Service Stations and Branches in All Principal Trucking Centers

A LIVE SELLING PROPOSITION



Kelley Convertible Truck Attachment

FOR A FORD CAR

In this construction the entire rear system of the Ford is discarded. The replacement carries 85 to 90 per cent of the load.

Cost of Attachment—internal gear..... $365
Total cost of Truck, including Ford, need not exceed.... $700

Not Cheapness, but High Quality at Low Cost. ***Sold under a Guarantee***

Good territory. Satisfactory discounts. Write or wire for details to

Kelley Convertible Auto Truck Co., 332 S. Michigan Ave., Chicago, Ill.
FACTORY: JOLIET

Digitized by Google

One Thousand Miles on High Gear

OVERLOADED 20 PER CENT.

Every hill on this route through Ohio and Michigan was taken on high without straining. Read the story in our booklet "The Wizard of Trucking." Only a Six and only a "Globe" could do it on 12½ miles per gallon of gas.



Six Cylinder Motor

trucks handle like a pleasure car. Start easier. On high 1½ miles to 25 miles per hour. 11 to 15 miles per gallon of gas. Quieter operation. Minimum motor vibration. Go anywhere, any roads, any time. Agencies being established rapidly. Write today.

MFG. BY

THE GLOBE MOTOR TRUCK CO.

NORTHVILLE, MICH.

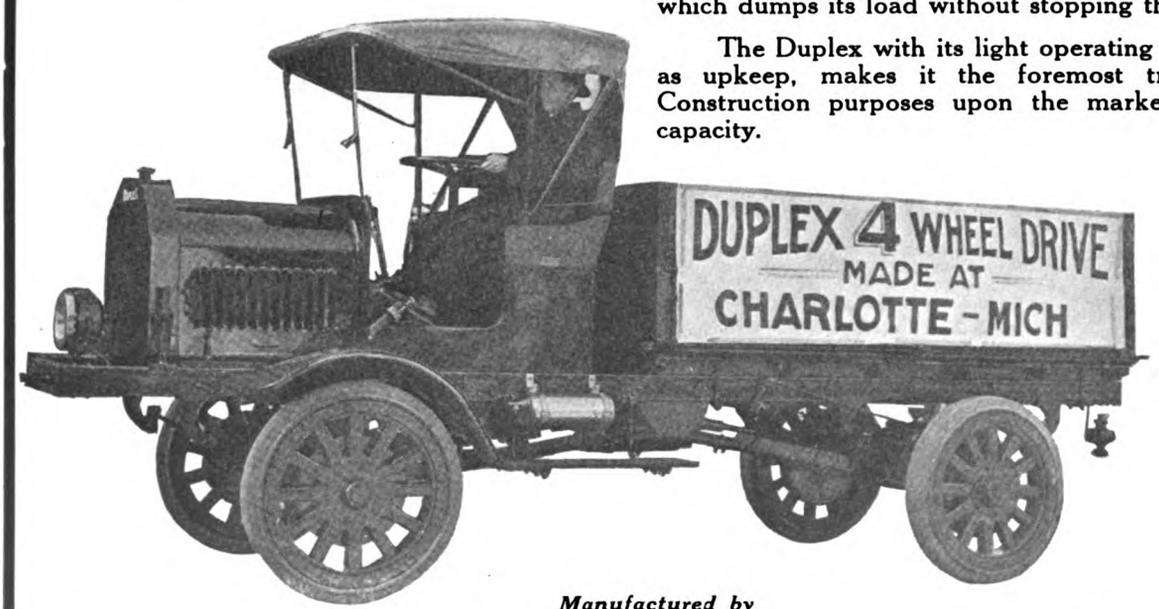
DUPLEX 4 WHEEL DRIVE

THE TRUCK OF EARNING EFFICIENCY

This cut represents the Duplex 4-Wheel Drive Road Truck, and is one of many others hauling one hundred and fourteen yards of gravel every twenty-four hours, a distance of 7.7 miles and at $1.00 per yard, earns $114.00 per day.

This truck with trailer has Duplex Side Dump Body which dumps its load without stopping the truck.

The Duplex with its light operating expense as well as upkeep, makes it the foremost truck for Road Construction purposes upon the market regardless of capacity.



Made in two-and three-ton capacity

Manufactured by

DUPLEX POWER CAR CO., Charlotte, Mich.

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Wilson

Turning Loss Into Profit

Cost of doing business is increasing by leaps and bounds. Competition is growing keener every day. Only the man who takes advantage of most modern equipment can hope to maintain his normal margin of profit.

Wilson Motor Trucks

have proven their economy and their dependability under the most severe conditions of actual service.

Fifteen years of manufacturing and engineering experience are back of them.

A manufacturer with a reputation to maintain guarantees them.

If you are a responsible dealer and think you can sell a truck of this type mail the coupon.

J. C. Wilson Company, Detroit, Mich.

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4 Cylinder—4⅛ and 5¼ Continental Motor, Sheldon Worm Drive Axle—
Capacity 2 to 4 tons

Price of Chassis $2350 *F. O. B. Detroit*

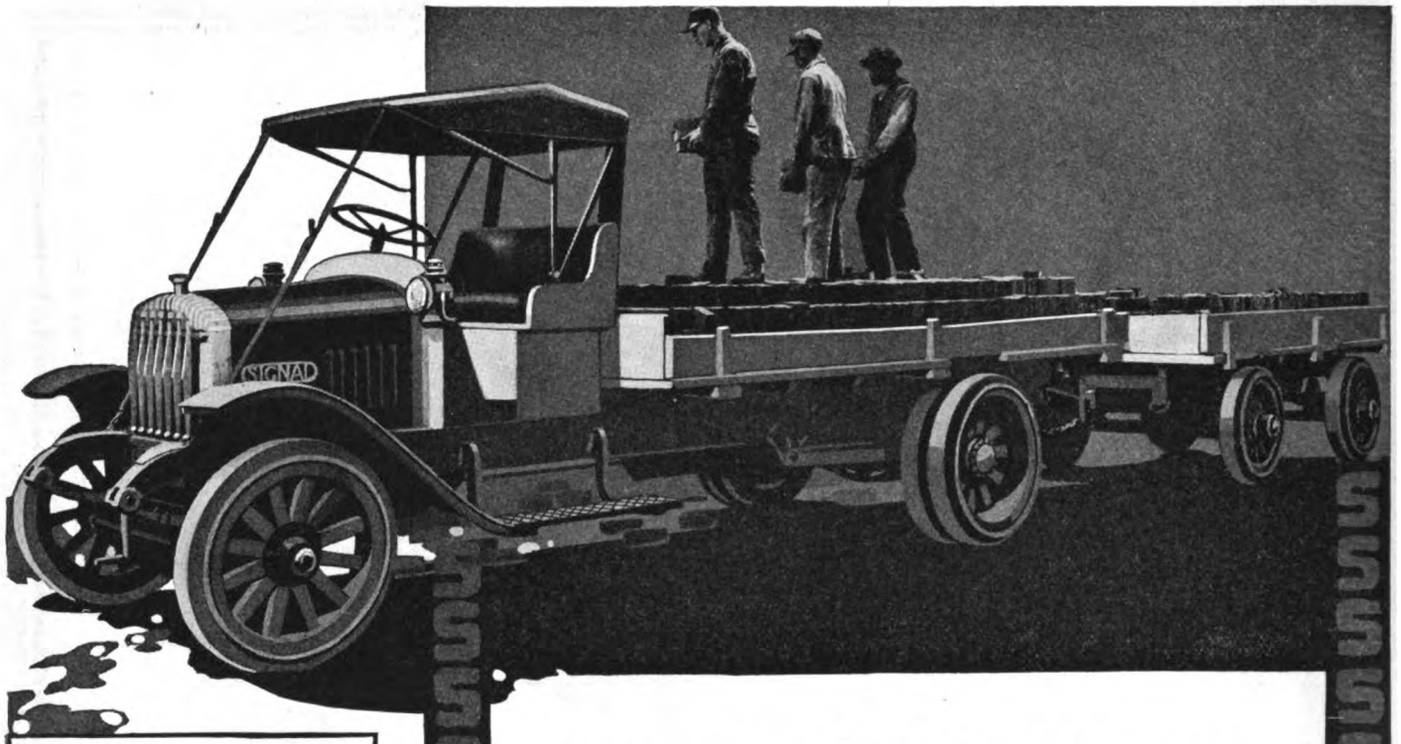
J. C. WILSON CO., DETROIT ***MAIL THIS***

Please send me your *New* Proposition to dealers.

Name _____

Address _____

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"On the Job"—Always

A Motor Truck is like a man. You invest in it for what it *does* rather than for what it *is*.

And big business says there is no better man-quality than the ability to be always "on the job."

For precisely the same reason that a man is profitable for what he *does* rather than for what he *is* a motor truck pays a profit only when it is persistently and consistently "on the job."

It is because we deem the ability to be "always on the job" the most important asset a truck *can* have that we emphasize it in Signal *construction* even more strongly than in Signal advertising.

It would be extremely foolish to put it in the advertising and leave it out of the construction. That is why Signal employs such units as Continental Motor, Timken-David Brown axles, Brown-Lipe transmissions, and Detroit Self-Lubricating Springs.

If the Signal idea appeals to you as a truck buyer or dealer get in touch with us at once.

Signal Motor Truck Co.

DETROIT, MICHIGAN

SIGNAL
1-1½-2-3½&5 TON

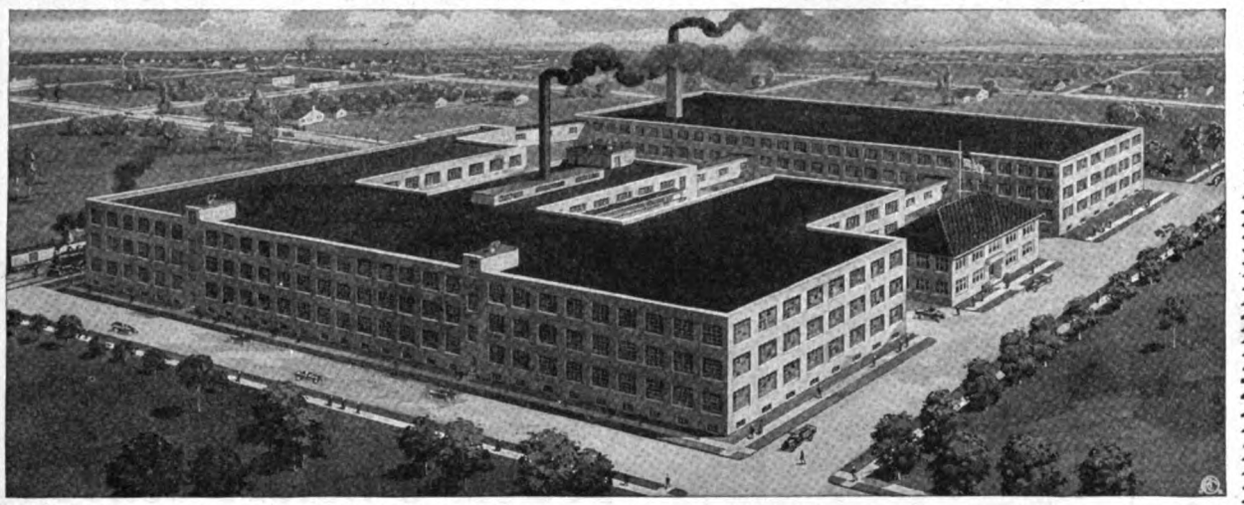
Dealers

The Signal idea is to put the Service in the truck, where it belongs.

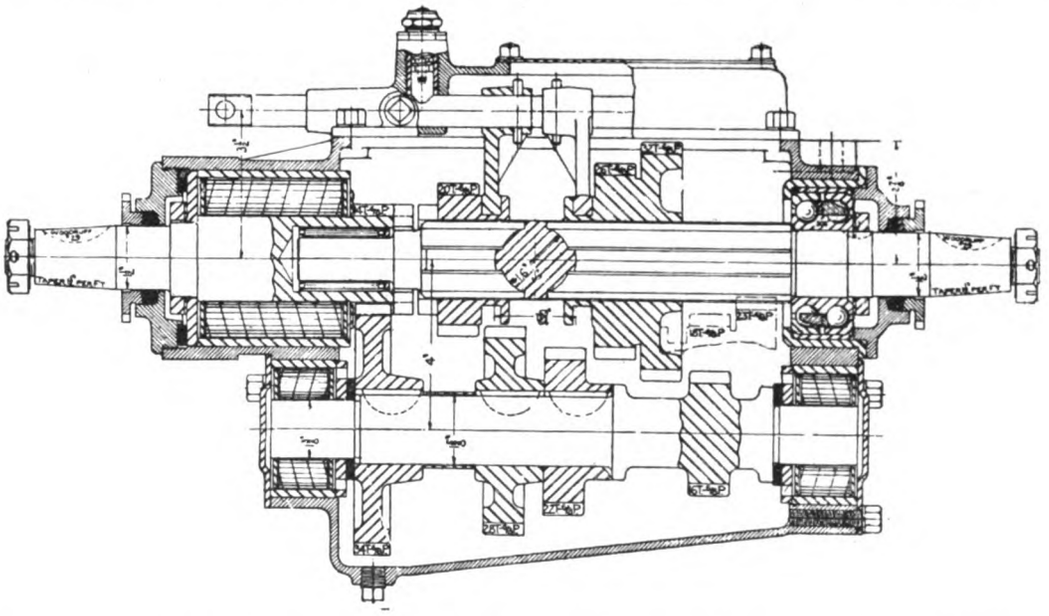
If this idea appeals our proposition will interest you immensely.

Worm drive only. 1½ tons to 5 tons.

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COVERT



Covert Gear Company, Inc.

Sales Offices
DETROIT, MICH.

Factory
LOCKPORT, N. Y.

Digitized by Google



Truck Owners Have Decided the Tire Leadership

A count of all truck tires in service today would show many more Firestone tires than any other make. For years Firestone tires have headed the list.

This is the unanswerable evidence of Firestone quality furnished by the truck owners themselves. Their preference is based on experience—the surest of all guides in selection.

With by far the greatest range of types produced, we can supply the tire exactly suited to your special needs—a tire for every road, load and condition of service. The pressed-on type here shown combines the unmatched resiliency and long-wearing toughness that distinguish the entire Firestone line. These tires can be applied to any S.A.E. wheel in a few minutes. They are pressed on the wheel under heavy hydraulic pressure. Creeping is impossible. Made in compounds for both gasoline and electric trucks.

Call on the Firestone headquarters nearest you for the experience and counsel of tire specialists. Or write us for details and low prices.

Firestone Tire and Rubber Company

"America's Largest Exclusive Tire and Rim Makers"

Akron, Ohio—Branches and Dealers Everywhere

Firestone

TRUCK TIRES

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Dealers' Co-operation

If you are not a Selden Dealer, you have yet to know what DEALERS' CO-OPERATION really means.

Here's an organization composed of men who at sometime or another in their business lives have been on your side of the fence, and as a result of this experience can give your problems intelligent consideration.

The Selden "selling agreement" is not a "ready made" one, but on the contrary is based on the dealer's actual needs depending on existing conditions in his territory.

We are most liberal with our dealers, which enables them to be even more liberal with their Selden customers. We can afford to be liberal, for when you "SELL 'EM SELDENS" your profits are permanent. You sell with the truck itself about all the "after" service it will ever need.

The Selden **"In-Built Quality"** line will build for you a lasting and permanent business.

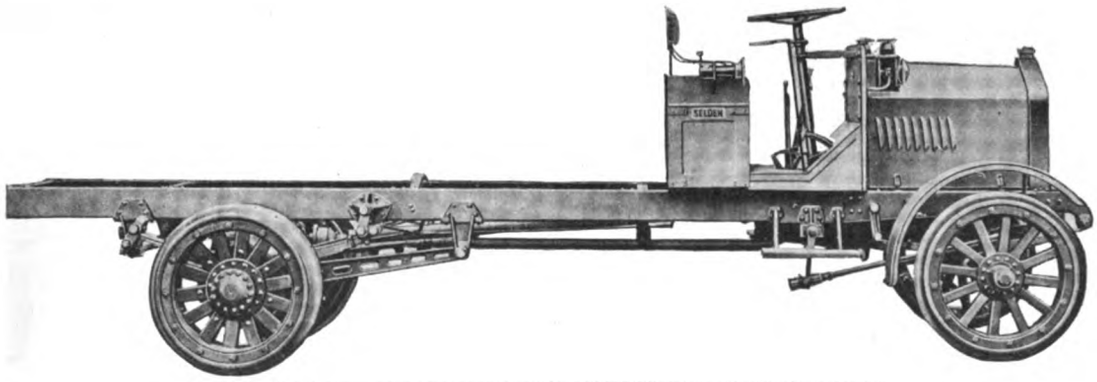
If we are not represented, write for our co-operative offer—you have never seen one like it—it will surprise and gratify you—and besides, it offers you extra profits plus contentment.

The Selden line consists of 1 ton, 2 ton and 3½ ton worm drive models. A worm drive light delivery car and a 2 ton Internal Gear Drive Model. Ranging in price from $985.00 to $2950.00.

SELDEN TRUCK SALES COMPANY

ROCHESTER, N. Y., U. S. A.

SELDEN TRUCKS



3½ ton Selden Model Chassis price $2950.00 f.o.b. Rochester, N. Y.

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Reo

From the Dealer's Standpoint This Reo Line Surely is Ideal

YOU CAN'T HAVE TWO religions and convince people you are sincere in both.

NOR CAN YOU consistently talk two different policies or two makes of cars. Or if you can, still you can't convince the buyer of your sincerity.

YOU MUST HAVE a "mental reservation" with regard to one or both—and it will appear "between the lines" or in the tone of your voice.

THE MOST SUCCESSFUL automobile dealers are those who have for several years handled one make of car exclusively—even when that car was made only in one model.

BUT YOU SAY you want more than one model—more than one price class. Can't blame you.

AND YOU WANT something to sell in January as well as in June—a good line of Motor Trucks.

WELL LOOK OVER this line of Reos and see if here isn't a variety made to your own order.

AND EVERY ONE, pleasure cars and trucks alike, of Reo quality—"The Gold Standard of Values."

NO, WE DO NOT need any more dealers just now. Can't supply the needs of those we have—as you know.

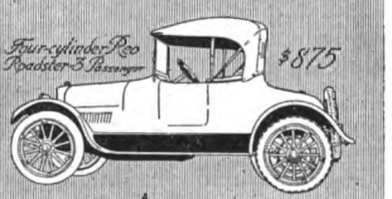
THAT ISN'T THE IDEA at all.

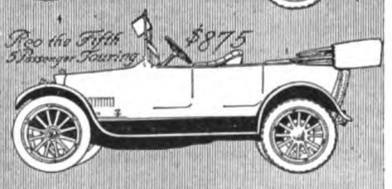
WE REO FOLK BELIEVE in looking ahead—a long way ahead. Keep up the momentum. Spread the prosperity over the years.

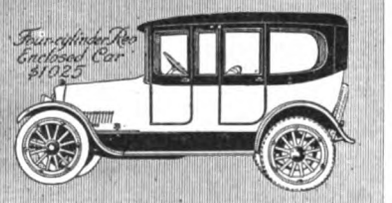
THERE MAY COME A TIME when we'll be ready to change in your territory or want a better representative in another. Keep in touch.

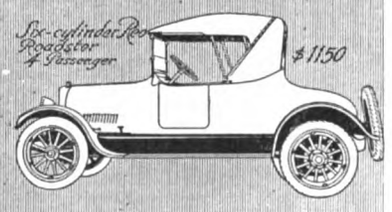
Reo Motor Car Company
Lansing, Michigan

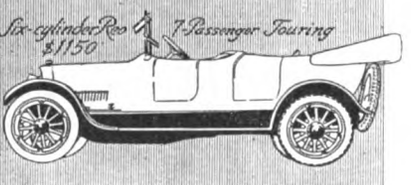
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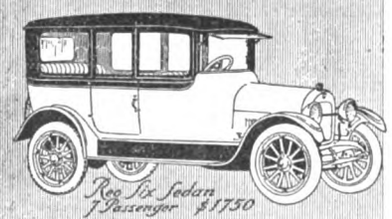


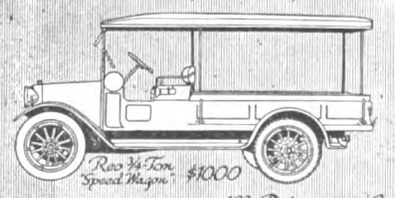


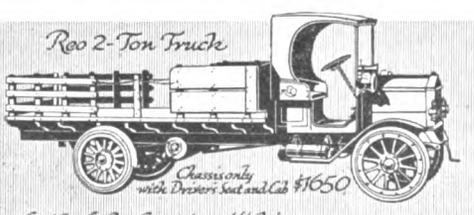










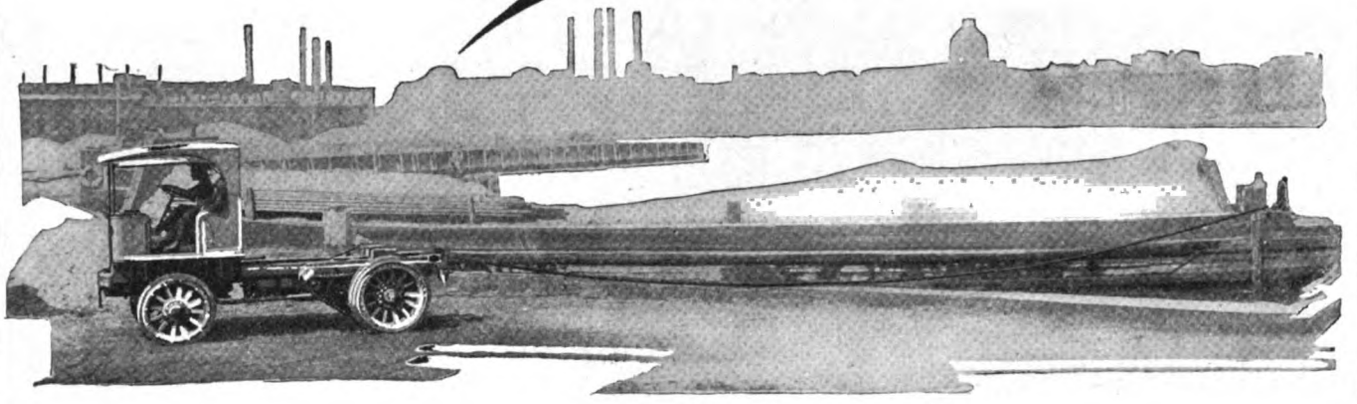


All Prices are duty paid f.o.b. Lansing, Michigan

"THE GOLD STANDARD OF VALUES"

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Garford MOTOR TRUCKS



It Takes the Place of 7 Horses

Frank J. Clancy, a big eastern contractor, says this one Garford truck takes the place of 7 horses and is much better and more useful in a thousand ways.

He uses it to tow scow loads of gravel into convenient positions for unloading—and then his Garford carries away the load and distributes it.

Mr Clancy has 120 horses but is going to shelve them all and motorize his hauling department.

For his Garford truck is *saving him money*.

Other concerns in all parts of the country have learned of the thousand and one advantages that the motor truck has over the horse.

And a tremendous field of opportunity lies before the dealer who handles such a truck as the Garford—a truck that will meet the most exacting demands in *any line of business*.

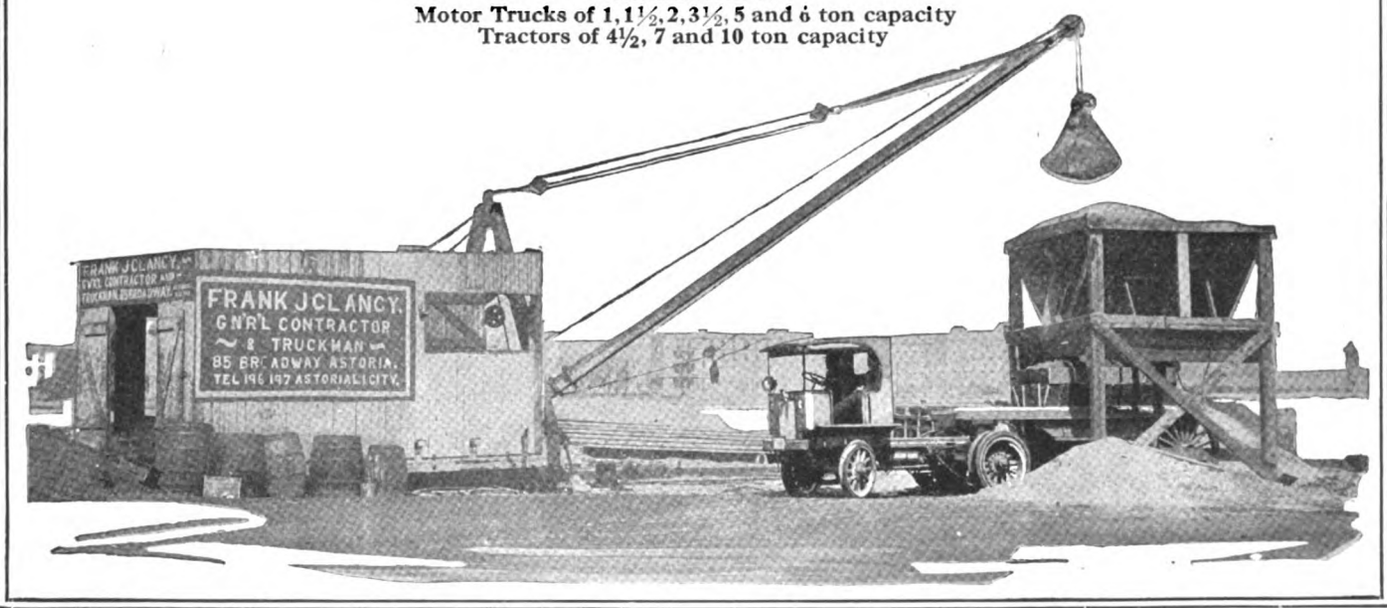
For Garford Trucks are *scientifically built* in all carrying capacities from 1 to 6 tons. And each gives the most economical, efficient service in its tonnage class.

Write us for our dealer's proposition. Address Dept. 103.

The Garford Motor Truck Company, Lima, Ohio

Manufacturers of

Motor Trucks of 1, 1½, 2, 3½, 5 and 6 ton capacity
Tractors of 4½, 7 and 10 ton capacity



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A 1 TON TRUCK with the Ford Cost of Upkeep—

$325

F.O.B. Detroit

56 or 64 INCH TREAD

Everyone knows the exceedingly low operating cost of the Ford and everyone is going to know how the "Tonford" truck unit attached to any Ford chassis, old or new, greatly reduces delivery costs—how it carries the same load more places, more quickly than any other one-ton truck and at much less operating cost.

The "Tonford" truck unit is built of the best materials. Its specifications compare most favorably with the best one-ton trucks—and you do not have to pay the original price of an ordinary one-ton truck, nor its higher maintenance cost.

Try It In Your Business

The "Tonford" truck unit has a wheelbase of 127 inches—longer than most trucks of similar capacity. It has a loading space of 9 to 11 feet back of the driver's seat and up to six feet wide, depending on the style of body. The heat-treated rear axle, 2⅛ x 2⅛, is guaranteed for one and one-half tons. Its roller bearings will carry 7500 pounds weight. Its wheels are heavy artillery type.

Make More Deliveries and Make Them Faster

The light, strong, easily handled "Tonford," with a special body adapted to your particular business, makes a marvelously cheap, effective form of delivery. Merchants find that the "Tonford" adds new customers, helps them to serve the old ones better at lower cost, is easy to operate, costs mighty little and is one of the best investments they can make. We recommend it to you. Let us give you the facts. Let us show you exactly what it will cost you to own a "Tonford."

The "Tonford" is easily attached to any Ford, old or new. Your Ford chassis is not mutilated. Only four-holes to drill in the frame. But, let us prove to you that the "Tonford" will make you money.

Dealers get our complete proposition. Write to-day

Detroit Truck Company, Mfrs.

Detroit

Merchants!

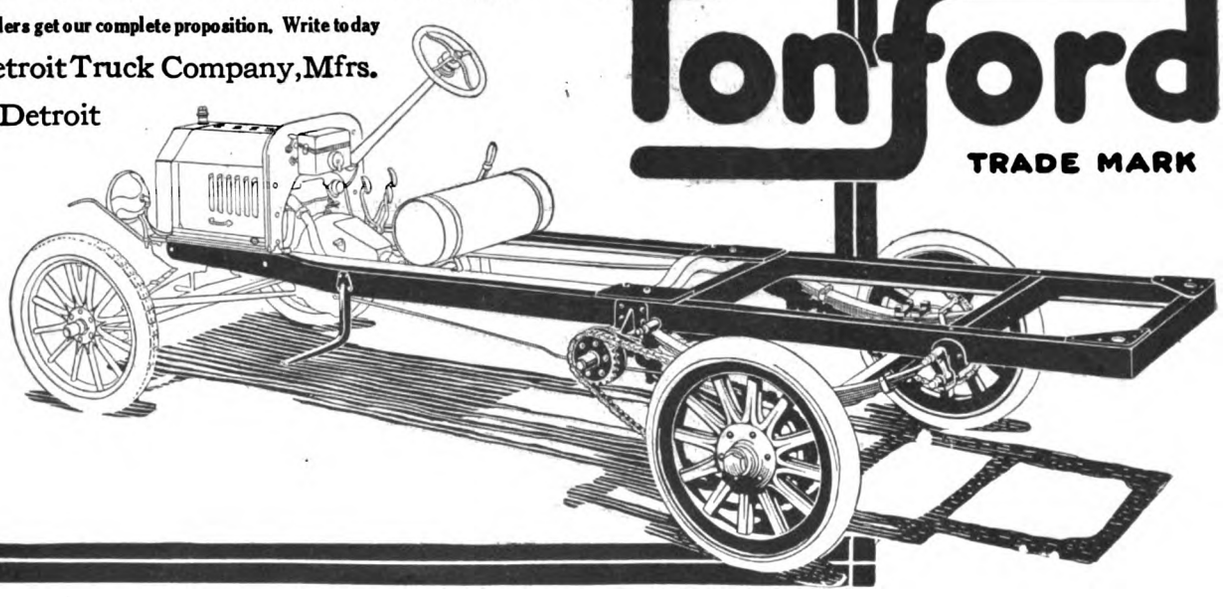
It matters not what line of business you are in, Motor Delivery is the thing. The "Tonford" is the most efficient form of motor delivery.

It costs little to buy and little to operate.

MADE IN DETROIT USA

Tonford

TRADE MARK



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We did *not* intend to anticipate your judgment

In our 1917 announcement (made in the last issue of the COMMERCIAL VEHICLE) through error a price was inserted after the specifications of the 2-ton truck.

PALMER

The Price of These Trucks Is Going To Be—What?

Nothing could be more open and above board than this. We give here our full specifications, and we ask you to examine them; to compare them with the specifications of all other trucks, as published in the COMMERCIAL VEHICLE of November 1st; and to make up your mind as to the relative value of the Palmer-Moore when compared with other trucks of like capacity.

Then write us the price at which you think we ought to sell them.

Do this right away—today! We shall announce the prices January 1st, and immediately thereafter territory will be allotted.

These prices will be based absolutely upon the opinions of you dealers; upon your judgment as to the relative value of these two new models.

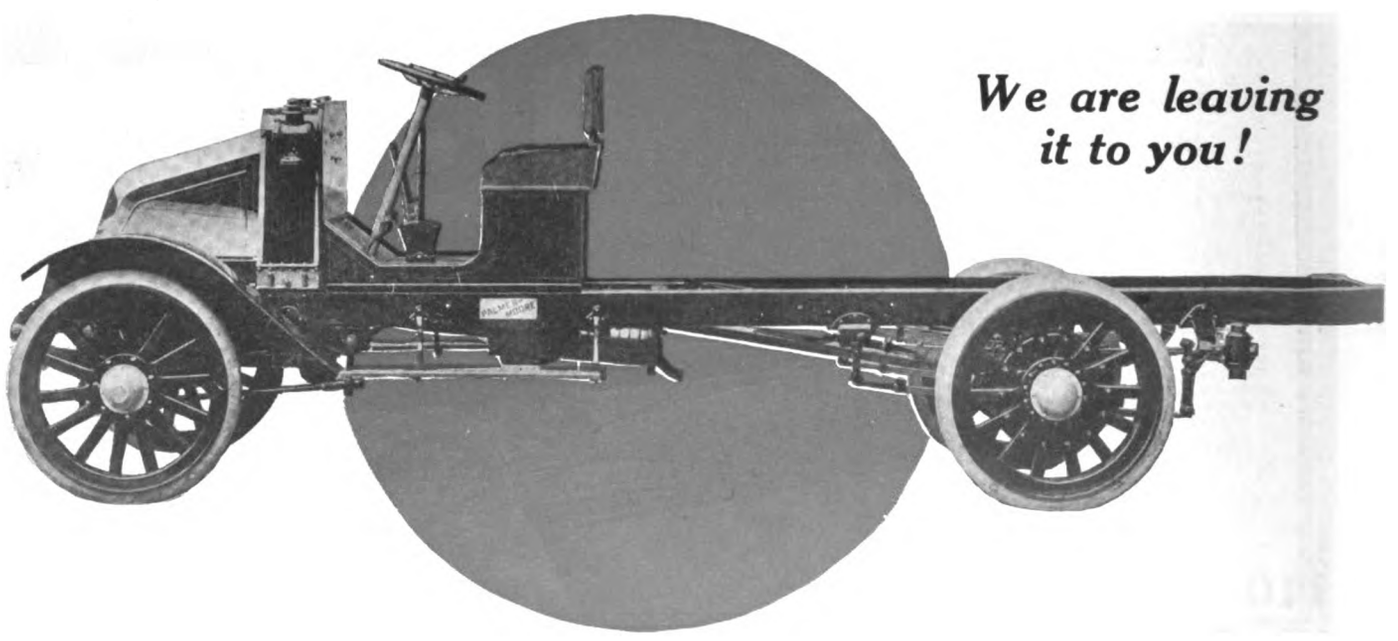
And territory will be allotted in accordance with the capacity of our plants. We will not allow our desire for agencies to lead us into obtaining more orders than we can promptly fill.

If you are selected as a Palmer-Moore Dealer, be certain your deliveries will be made—and made promptly, unfailingly.

Don't get left on this big opportunity—cinch your territory NOW!

And you can be certain of every protection and every sales help in your territory, including the necessary financing to extend time to those of your customers who need it.

Consider this splendid truck, its unusual attributes, the exceptional care we take of our Dealers, and then **write at once,** telling us what **you** would charge for these new models.



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No price whatever has been fixed at the factory for either of these trucks. We repeat what we said last week, that it is the dealers throughout the country who are to fix the price of these trucks.

Read the following and let us know what you think they are worth:

MOORE

Read Them Again

(SPECIFICATIONS)

MODEL M—1 TON CAPACITY

(Designed to Stand Excess Strain)

MOTOR—Buda. 3½" bore by 5½" stroke, 4 cylinder L Head cast enbloc. Enclosed valve mechanism. Valves interchangeable, stems hardened, 1⅛" working diameter, removable bushings. Three bearing crank shaft, balanced. Pistons, connecting rods and all reciprocating parts balanced. All moving parts easily accessible. Constant level oiling system, positive pump. Oil supply 7 quarts capacity. Thermo-syphon cooling. Main and connecting rod bearings, bronze shell, nickel babbitt. Cam-shaft bearings phosphor bronze. High tension magneto with special automatic spark advance. Zenith carburetor. Automatic governor controlled by suction of gas. Three-point suspension.
RADIATOR—Dash-board type. Seamless helical tubes. Top and bottom sections cast, bolted to cooling sections. **Cooling sections interchangeable.** Spring mounted.
CONTROL—Left-hand steer. Center control gear shift and emergency levers. Foot pedals for clutch and service brakes. One lever only (for throttle) on steering wheel. Spark control automatic.
DRIVE—Straight line through four universal joints (two ahead of transmission) and 2¼" tubular shaft to internal gear rear axle.
GEAR RATIO—Direct on high, 7.1 to 1. Second 10.6 to 1. Low 18.9 to 1. Reverse 26.2 to 1.
ROAD SPEED—20 miles per hour at 1400 motor R.P.M.
CLUTCH—Borg & Beck. 10" multiple disc.
TRANSMISSION—Covert. Selective type. Three forward speeds, one reverse. All gears nickel steel, ⅞" face. Hyatt roller bearings.
FRONT AXLE—Sheldon. "I" beam section, spindles 1 37/64" by 1⅜". Bower roller bearings.
REAR AXLE—A dead axle carries the load and takes all road shocks. The live axle and the internal gears, located in the rear wheels, transmit the power and have to stand transmission strains only. Bower roller bearings.
BRAKES—Service 15" x 2½", external contracting on rear wheels. Emergency 14⅝" x 2¼", internal expanding on rear wheels. Both have extra length equaliser bars.
FRAME—Parish and Bingham. 3/16" pressed steel, channel section, 38" wide and inswept to 33½" between front wheels. 4½" deep, 3" wide at offset, 180" long. Cross members and corners gusseted and hot riveted.
SPRINGS—Semi-elliptic. Front 38" x 2", 8 leaves. Rear 50" x 2", 8 leaves. Front hanger of rear spring designed to take driving thrust and prevent breakage of spring eye. Adjustable to relieve pressure and wear on spring bolt. Rear spring design includes a straight underslung spring, 3 leaves, to prevent rear end jumping up, also to act as auxiliary spring under excess loads. **Both front and rear springs designed with special non-slip feature.** All spring bolts have grease cups.
WHEELS—Artillery type. 14 1¾" square spokes, front and rear.
TIRES—Motor truck type. Front 34" x 3", rear 34" x 4".
STEERING GEAR—Ross, worm and nut type. 18" hand wheel.
WHEEL BASE—126". Tread 56".
FUEL TANK—Pressed steel, 16 gallons capacity.
STANDARD BODIES—Open express, stake (both styles with or without driver's cab), express with full top, and full panel.
LOADING SPACE—Standard; 9 feet long by 46" wide back of driver's seat. Height of floor 34" from ground.
STANDARD COLORS—Chassis, red. Body, Richelieu blue.
EQUIPMENT—Running boards, front and rear mudguards with aprons. Side and storm curtains with all cab tops or top bodies. Oil side and tail lamps. Complete set of tools in kit. Horn.

MODEL O—2 TON CAPACITY

(Designed to Stand Excess Strain)

MOTOR—Buda. 4⅛" bore by 5½" stroke. 4 cylinder L Head cast enbloc. Enclosed valve mechanism. Valves interchangeable, stems hardened, 1⅝" working diameter, removable bushings. Three bearing crank shaft, balanced. Pistons, connecting rods and all reciprocating parts balanced. All moving parts easily accessible. Constant level oiling system, positive pump. Oil supply 8 quarts capacity. Pump cooling. Main and connecting rod bearings, bronze shell, nickel babbitt. Cam-shaft bearings phosphor bronze. High tension magneto with special automatic spark advance. Zenith carburetor. Automatic governor controlled by suction of gas. Three-point suspension.
RADIATOR—Dash-board type. Seamless helical tubes. Top and bottom sections cast, bolted to cooling sections. **Cooling sections interchangeable.** Spring mounted.
CONTROL—Left-hand steer. Center control gear shift and emergency levers. Foot pedals for clutch and service brakes. One lever only (for throttle) on steering wheel. Spark control automatic.
DRIVE—Straight line through four universal joints (two ahead of transmission) and 2½" tubular shaft to internal gear rear axle.
GEAR RATIO—Direct on high 8 to 1. Second 12.8 to 1. Low 26.4 to 1. Reverse 34.4 to 1.
ROAD SPEED—15 miles per hour at 1175 motor R.P.M.
CLUTCH—Borg & Beck. 12" multiple disc.
TRANSMISSION—Covert. Selective type. Three forward speeds, one reverse. All gears nickel steel, 1¼" face. Hyatt roller bearings.
FRONT AXLE—Sheldon. "I" beam section, spindles 1 31/32" by 1¾". Bower roller bearings. Steering knuckle has ball thrust bearing.
REAR AXLE—A dead axle carries the load and takes all road shocks. The live axle and the internal gears, located in the rear wheels, transmit the power and have to stand transmission strains only. Bower roller bearings.
BRAKES—Service 18" x 2½", external contracting on rear wheels. Emergency 17½" x 2¼", internal expanding on rear wheels. Both have extra length equaliser bars.
FRAME—Parish and Bingham. 7/32" pressed steel, channel section, 38" wide and inswept to 34¾" between front wheels. 5 9/16" deep by 3" wide at offset, 212" long. Cross members and corners gusseted and hot riveted.
SPRINGS—Semi-elliptic. Front 40" x 2½", 9 leaves. Rear 50" x 2½", 11 leaves. Front hanger of rear spring designed to take driving thrust and prevent breakage of spring eye. Adjustable to relieve pressure and wear on spring bolt. Rear spring design includes a straight underslung spring, 3 leaves to prevent rear end jumping up, also to act as auxiliary spring under excess loads. **Both front and rear springs designed with special non-slip feature.** All spring bolts have grease cups.
WHEELS—Artillery type. 12" square spokes, front and rear.
TIRES—Motor truck type. Front 34" x 4", rear 34" x 6" single.
STEERING GEAR—Ross. Worm and nut type. 18" hand wheel.
WHEEL BASE—140" or 160". Tread 56".
FUEL TANK—Pressed steel, 16 gallons capacity.
STANDARD BODIES—Open express, stake (both styles with or without driver's cab), express with full top, and full panel.
LOADING SPACE—Standard: 11 ft. long by 56" wide. Height of floor 37" from the ground.
STANDARD COLORS—Chassis, red. Body, Richelieu blue.
EQUIPMENT—Running boards, front mudguards with aprons. Side and storm curtains with all cab tops or top bodies. Oil side and tail lamps. Complete set of tools in kit. Horn.

PALMER-MOORE COMPANY

110 N. Geddes Street **Syracuse, N. Y.**

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No Weak Links

The old thoroughly established axiom that no chain is stronger than its weakest link is just as applicable to ball bearings as it is to chains.

No ball bearing is stronger than its weakest part.

If raceways are sacrificed in thickness in order to enable the carrying of more balls there is no gain because of the added carrying capacity of the greater number of balls. For it is entirely possible to get a ball carrying capacity that will not be sustained by the raceways in which the balls are mounted.

The ideal ball bearing is the bearing in which ball capacity is identical with race capacity.

Such are U. S. BALL BEARINGS. They are what we call balanced bearings, in that both in design and manufacture every component part is designed with relation to its other fellow parts. This balancing, combined with high quality materials and the highest type of manufacturing methods, give to U. S. BALL BEARINGS an exceedingly great carrying capacity and endurance.

U. S. Ball Bearing Manufacturing Co.

(Conrad Patent Licensee)

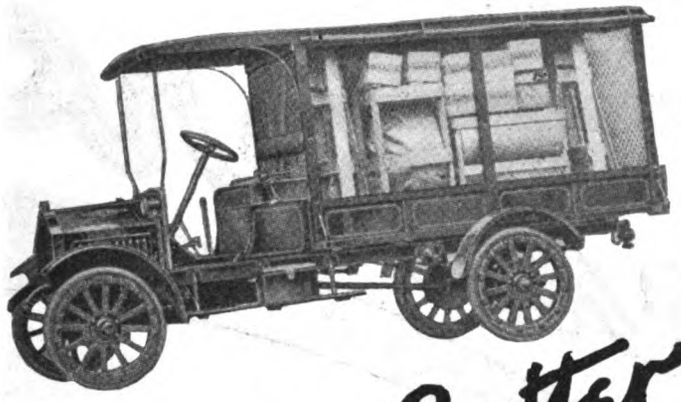
Palmer St. and Kolmar Avenue, Chicago

Inserted photograph shows new U. S. Ball Bearing factory
General view shows part of the screw machine department

U. S.

BALL BEARINGS

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A Better Truck is not for Sale!

WHEN the enthusiastic representative of a motor truck manufacturer tells you that his line is better than the Bessemer, well, he's mistaken!

A better truck is not for sale. Money can't buy higher quality than is built into

THE BESSEMER LINE

With component parts made by the acknowledged leaders of the truck industry, our experienced designers have conceived and caused to be built a rugged, dependable truck, simple in construction, powerful, economical in first cost and operating expense and efficient in service even when driven by unskilled or careless drivers.

For Contractors and Merchants

these trucks offer the means of lowest cost transportation. They are light without having strength sacrificed, strong without being clumsy, simple without economizing on essentials.
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Internal Gear Shaft Drive	Worm Drive	Worm Drive
$1095 or	$2200	$3100
1075 Chassis only		

DEALERS—Write us NOW for our liberal selling plans. We give interested factory co-operation and enterprising aid to our dealers.

All inquiries regarding territory in New England, Eastern New York, Eastern Pennsylvania, New Jersey, Delaware, Maryland, Virginia and District of Columbia should be addressed to our Eastern distributors:

Bessemer Motor Truck Corporation

Lexington Avenue and E. 42nd Street NEW YORK CITY

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Announcing Commerce

Completely equipped with Starting and Lighting System, Windshield, Stewart Vacuum System, Bumper, Pierce Governor and Open Express Body—Internal Gear Drive.

$1175

F. O. B. Detroit

COMPLETE in every detail—even including Remy Electric Lighting and Starting equipment—and with all parts large enough for far greater capacity, the Model "E" Commerce One-Ton Truck is now ready for the market. By glancing over the specifications it will be seen that everything that any person could ask for is on the truck, and it is shipped to the dealer in such complete state that he can get his money the day the truck is received because it is ready for instant delivery to the customer.

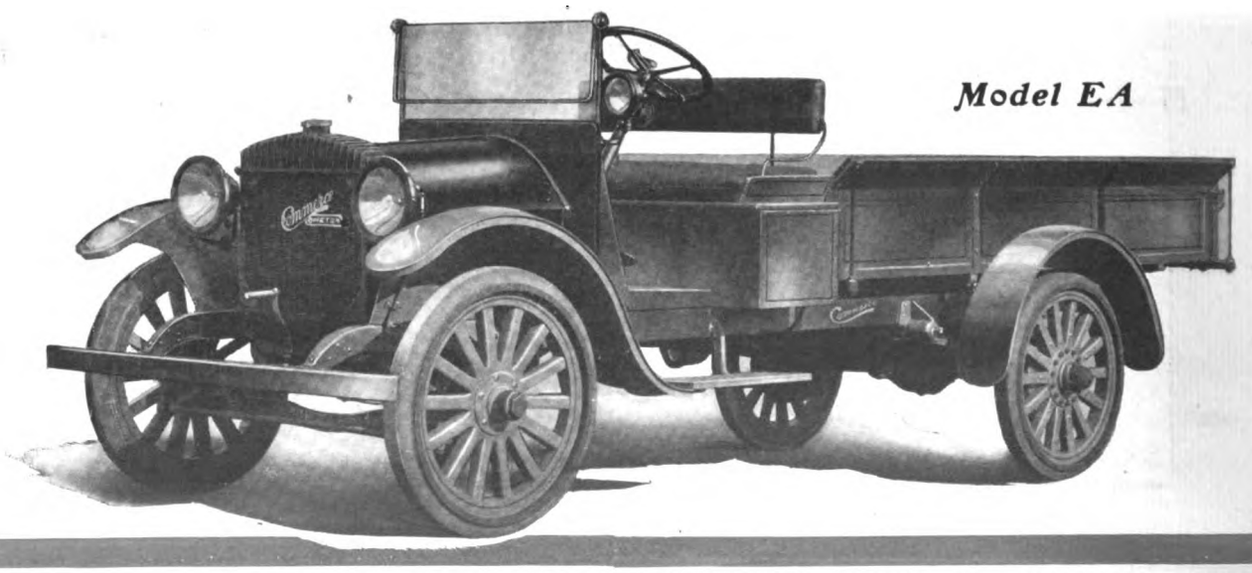
Deliveries begin November 15th. Model EA as shown below lists at $1,175. Model EH as shown on opposite page lists at $1,250—this includes standing top and full storm curtains.

The motor is Model "N" Continental unit power plant, 3½ in. bore, 5 in. stroke. Transmission is of the three speed selective type, center control, with leather faced cone clutch, standard dimensions. Steering gear is of the well known Jacox type, double worm and split nut. The steering wheel is 18 in. in diameter.

Radiator is of the cast tank and side member type—Commerce type. Universal joints and drop forgings with felt washers and circular wire springs for retaining the grease. Propeller tube is 1¾ in. outside diameter, tubular, by 3/16 in. wall.

The rear axle is Torbensen internal gear driven, using both Bower and Bock roller bearings. The front axle is of the I-beam section, using Bower roller bearings in the hub. Tires are 34 x 3 solid in front and 34 x 4 solid in rear. Wheel spokes are square type 1 in. wide.

Frame is 3/16 high carbon steel, having tensile strength of from 60,000 to 80,000 lb. per square inch. Frame is 4½ in. deep, with width of flange varying from 2¼ in. at front end to 3½ in. in center and 2 in. in the rear. Brakes are internal expanding and external contracting. Internal brake is 15½ in. in diameter, 2¼ in. wide; external 16 in. in diameter and 2½ in. wide.



Model EA

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One Ton Model

Complete in Detail

A rigid bumper is furnished with all cars. Designed especially for the truck. Spring eyes and shackles are bronze bushed, lubricated by oil cups located in the spring bolts and in the shackles. As stated above, Remy Electric Starting and Lighting equipment is furnished with all trucks as standard equipment, in combination with the Willard Storage Battery.

Stewart vacuum feed system drawing gasoline from a 15-gallon welded steel tank located under the driver's seat, is used in connection with model 04 Zenith Carburetor.

Pierce Automatic Governor, which is standard equipment on the chassis, is driven from the propeller shaft. This governor controls the wheel speed rather than the motor speed, thereby allowing the motor to develop full power whenever full power is necessary.

Powerful electric headlights, spotlight and tail-light, are furnished. Front springs are 36 in. long by 2 in. wide; rear springs 50 in. long by 3 in. wide, with torque and drive taken from rear springs. These springs are silico-manganese, fully guaranteed for two years against breakage.

Wheelbase is 126 in. Standard bodies have loading space of 44 in. by 110 in.

As stated above, the truck is shipped complete rather than in the lead, which necessitates the delay of painting, etc. This also applies to the chassis when shipped without body.

We feel safe in saying that no job ever offered to the public is as complete in every detail, and has as high a factor of safety in every part as this Commerce One-Ton job.

It is particularly attractive to dealers, because of the fact that it is so substantial and so complete that the dealer can get his money immediately upon receiving the truck.

In our judgment it is just as big, if not even bigger value for the money than the highly successful 1500-pound Commerce truck that sells for $975.00 complete with the choice of three bodies—the truck that has made a most enviable reputation during the past six years. The addition of this one-ton job to the Commerce line makes the Commerce agency one of the most attractive truck agencies possible for a dealer to select.

Broad Co-operation

The same generous discounts and broad co-operative plans which have established the Commerce so soundly in the past years apply to this new one-ton truck. In addition to that, the Commerce Motor Car Company has provided a plan for financing deferred payment sales, without the payment on the part of the dealer of any commission or brokerage fees, and also a plan which enables the dealer to carry a large stock of trucks if he so desires.

Attention is called to the fact that while the Commerce 1500-pound job is listed at $975.00 complete with a choice of three bodies, the list prices on this one-ton job are $1,175 for the Model EA complete; $1,250 for the Model EH complete.

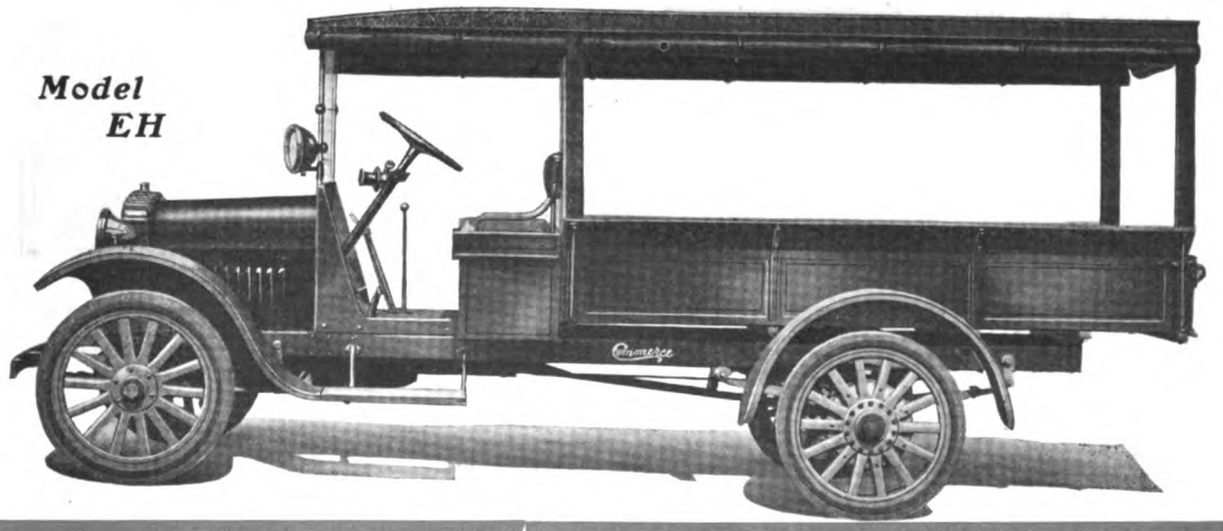
This includes starting and lighting equipment, headlights, spotlight, windshield, storage battery, driver's seat, Stewart vacuum system and Pierce automatic governor.

The addition of this one-ton job adds so materially to the attractiveness of the Commerce agency that we advise any prospective dealer who wants to get into the Commerce family to act quickly. Get in touch with us today.

COMMERCE MOTOR CAR COMPANY

DETROIT *W. H. BRINKERHOFF* **MICHIGAN**

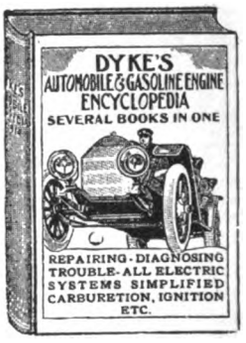
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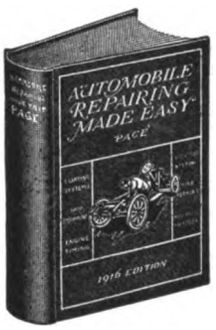
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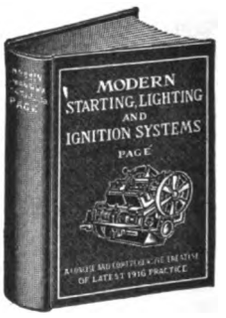
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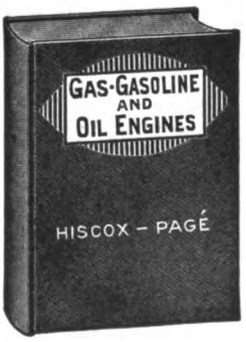


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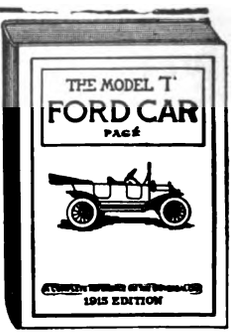
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Its sojourn in the small building was short because its success was sure and it soon outgrew the space.

Since then enlargements have been necessary each year until the FEDERAL FACTORY now occupies acres where it formerly covered feet.

The Fidelity with which each FEDERAL has been built since the first one has found favor with the business world. Dealers have approved of it and backed it with their confidence—the result has been—

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Carry on a Larger Business

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The modern merchant builds for tomorrow.

Store space is enlarged—sales men and women are trained to more efficiency—office methods are systematized—customer service is improved—no item of business building value is overlooked.

That is why the delivery service must be modernized to the minute.

The H. G. Seeger & Sons Furniture Company of Buffalo, N. Y., decided to try trucks for delivery and purchased a 1½-ton FEDERAL.

In one month this Federal made 107 trips, delivered home furnishings to 571 customers, a weight of 45,000 pounds, traveling over 960 miles.

This was all done at a cost including the driver's wages of $6.18 per day.

This is reasonable, every-day performance for Federals. They can do as much for your prospects.

Federal Traffic News, with records of FEDERAL Successes, Sent Monthly on Request.

The Federal Motor Truck Co.

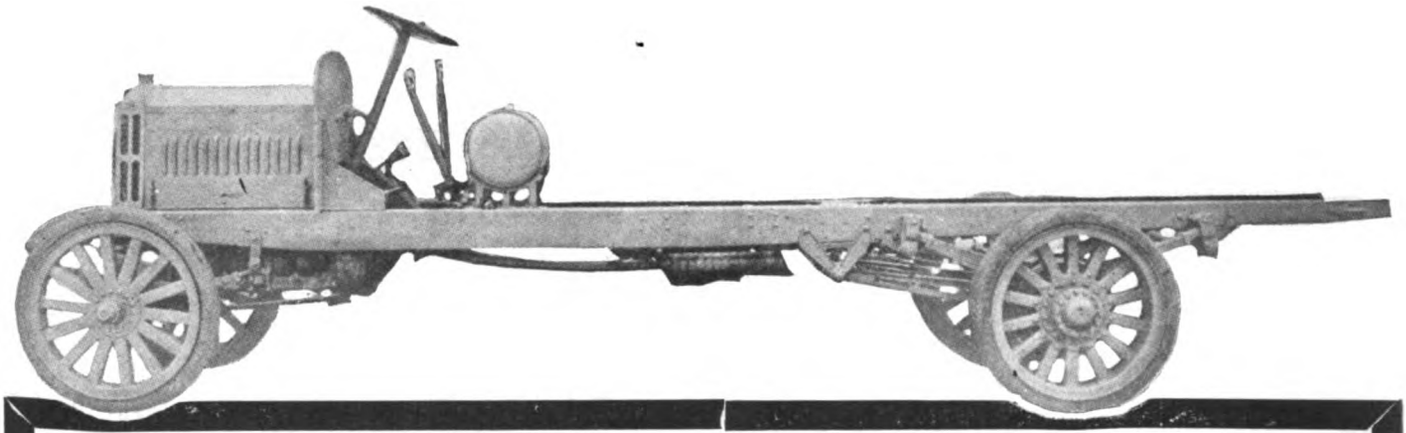
DETROIT, MICHIGAN

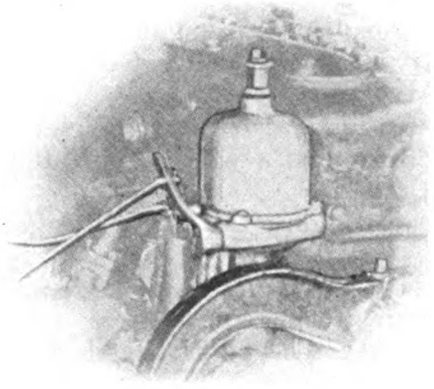


This is a 3½-ton FEDERAL Moving Van — Built to "Carry on a Larger Business" in Flint, Mich.



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in which are combined
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Guaranteed by manufacturers with 16 years' experience in motor vehicle construction.

A simple, powerful Continental Motor furnishes the power which is transmitted through a Timken-Brown Worm Drive to the wheels. The cooling is affected by a Renault type radiator. Fuel economy is obtained by a Special KREBS Carburetor.

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Any man who can steer can operate a KREBS. Mechanic-chauffeurs are not required as drivers. This is but one of the reasons for its economical operation.

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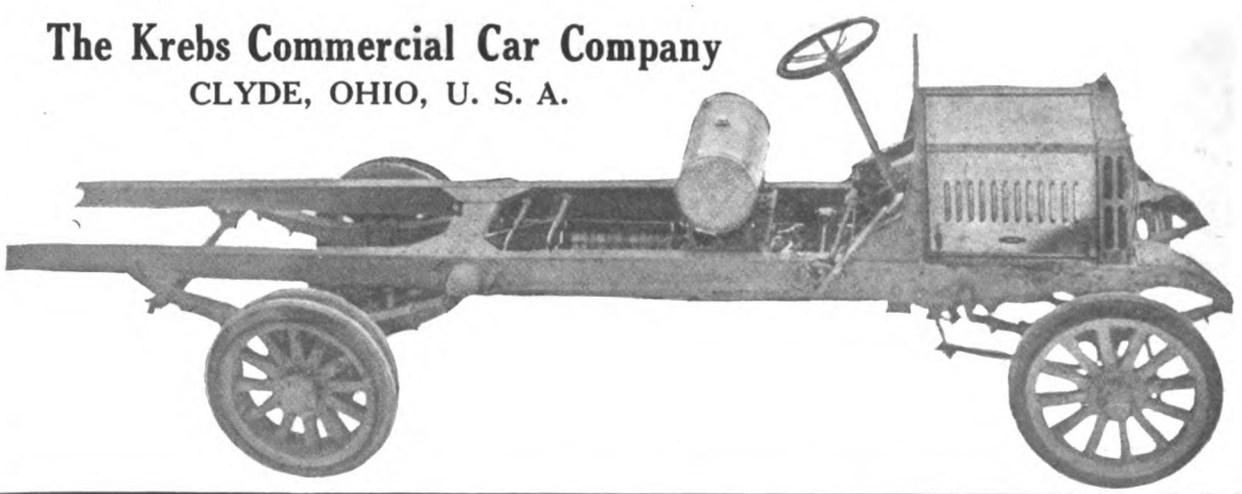
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KREBS are made in ¾, 1, 2 and 3-ton capacities.

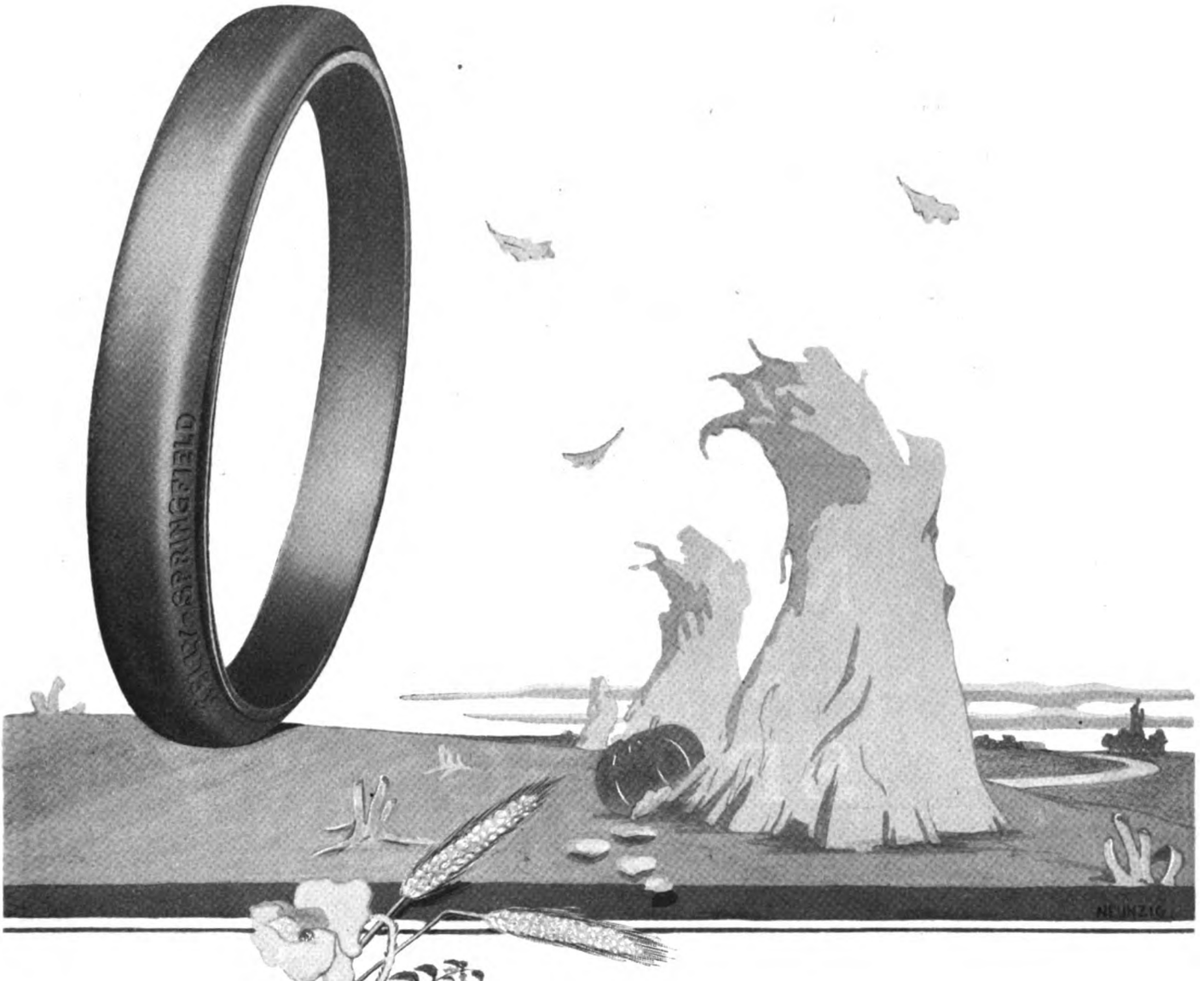
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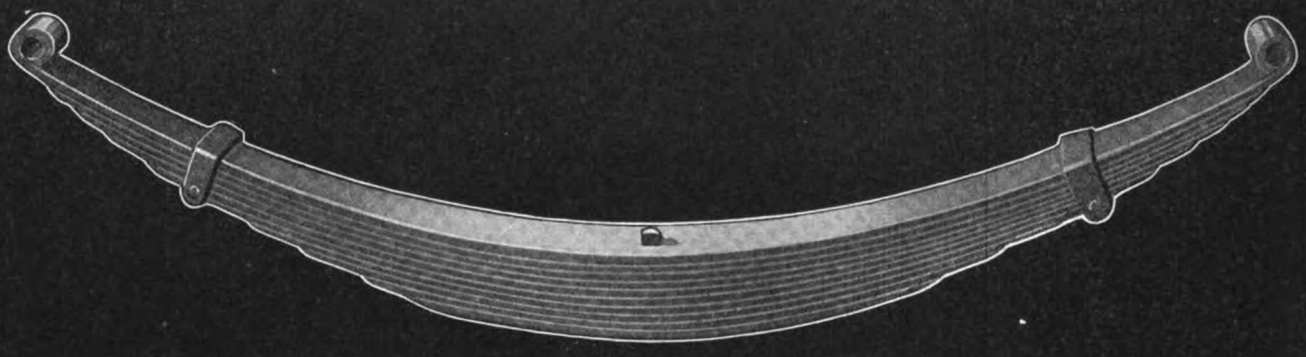


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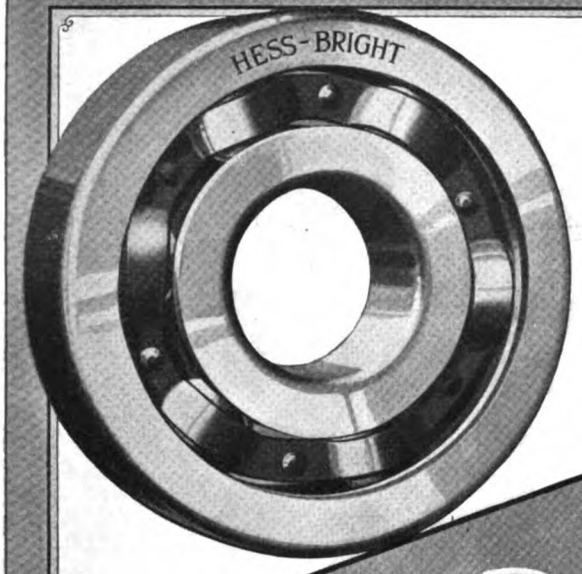
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THE INIMITABLE BEARING



THE HESS-BRIGHT BEARING meets every condition of load and speed and every requirement as to accuracy and silent operation, in a manner unequaled in other bearings.

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Read by Business Men

Published on the first and 15th of every month
Entered as second-class matter, September 13, 1906, at the Post Office, New York, N. Y., under Act of Congress, March 3, 1879

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The Commercial Vehicle, Inc.

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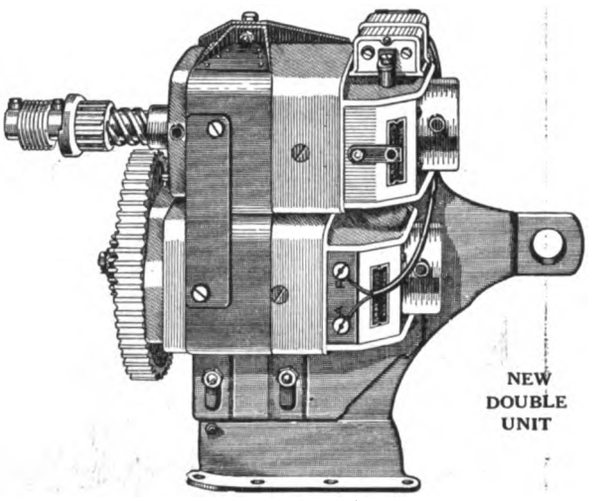
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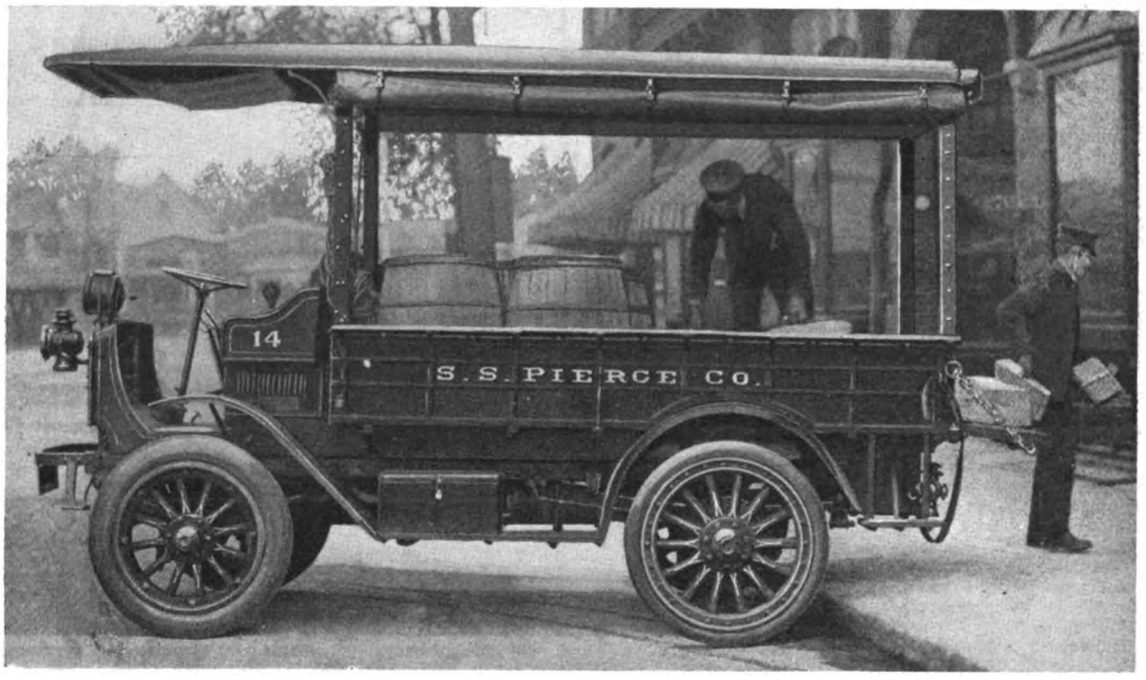
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The Autocar

Chassis $1650

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Built to handle two tons every day, yet so economical as to pay when lightly loaded, the Autocar answers the widest range of delivery problems. The proof is found in the repeat orders constantly received from concerns who have used Autocars over long periods of years.

Tebbetts & Garland, Grocers, of Chicago, say:

"We have tried various makes of trucks and the Autocar has proved by far the most reliable and economical. It has given perfect service, with upkeep cost reduced to a very low figure.

"Averaging 85 stops per trip, throughout Chicago and as far as 20 miles into the suburbs—and this twice daily—the car has established a record for practicability as far as we are concerned. On the strength of its performance, we have just bought two additional Autocars and intend to add more in the near future."

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Motor Delivery Car Specialists — Established 1897

Sales and Service Plants

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The Commercial Vehicle
Read by Business Men
Vol. XV December 1, 1916 No. 9

Achievement of Success in Parcel Work Due to Co-ordinated Efficiency

Parallel Development of Internal and External System Built Up Largest Delivery Company

By Joseph Husson

DOVETAILED TEAMWORK has been responsible for the success of the Clearing House Parcel Delivery Co., Boston, Mass. That concern differs from others in that its entire business is the collection and delivery under contract of small packages from a large number of stores. It neither makes nor sells the goods which it handles. It simply sells its delivery service.

The teamwork which has been responsible for its success is the closest sort of co-operation between that half of the business organization which handles and properly routes the packages inside of its plant, and the other half whose duty is to deliver the packages from the plant to their final destination.

The working of these two portions of the organization is analogous to a team of horses pulling on a common evener bar. If one horse pulls harder than the other, part of the team's power is lost in a tendency toward lateral motion instead of a direct, straight-ahead pull.

So it is with the Clearing House company. If either the interior division or the outside section lags behind in its efficiency, the direct progress of the concern is hampered. It has been the elimination of this uneven pulling which has resulted in the concern's success.

The business of parcel delivery is based upon the assumption that one highly-organized delivery service covering a large territory can deliver the merchandise from a group of stores more cheaply than any one concern can deliver its smaller number of packages in the same territory.

Boston Conditions Ideal for Work

The fact that Boston has the largest suburban population, in proportion to the number who work within the city limits, of any city in this country, makes it perhaps the best field in which to operate such a delivery concern. Under these conditions any one Boston store has to deliver comparatively small loads in various suburban areas which require fairly long hauls because of the large territory in which the day inhabitants of Boston have their homes.

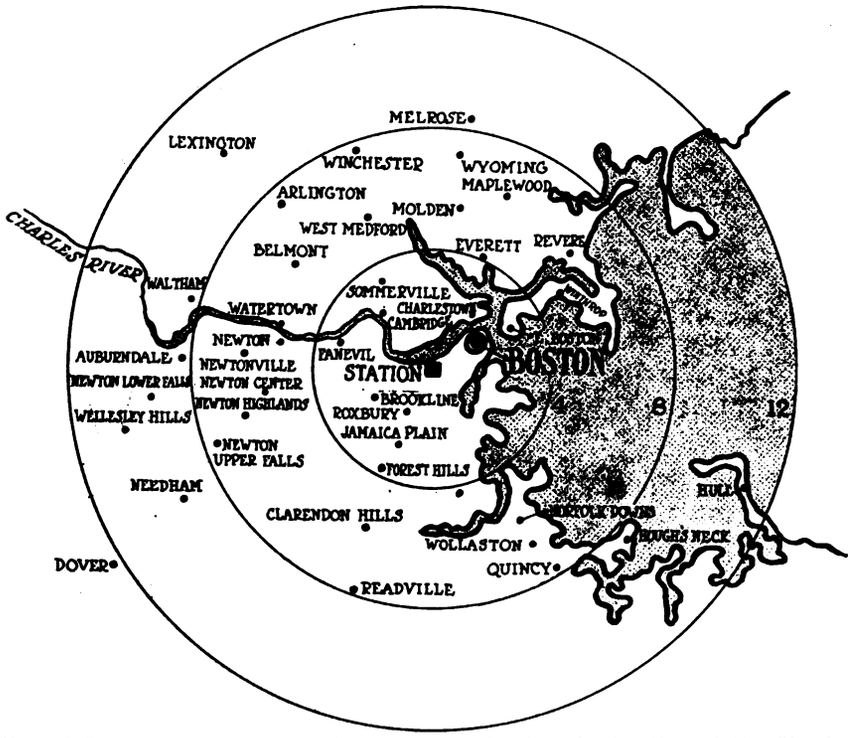
The number of packages to be delivered by each company in any one section is thus comparatively small, sometimes being only a fraction of the capacity load of the vehicle employed. Yet to reach the points of delivery would require the time of the truck for the entire day. This, of course, tends to make the cost of the truck delivery prohibitive.

On the other hand, a concern like the Clearing House company is more



The front of the Clearing House Parcel Delivery Co.'s plant showing the fleet of five Dart 2-ton trucks used to pick up the packages from the places of business of the concern's 150 customers. The door of the unloading platform is shown directly behind the truck on the extreme right. Note also the wooden planking on the roof of the one-story garage, on top of which the plant is situated. The level shown is reached by a wide ramp from the street. Note also that the trucks are equipped with pneumatic tires in front for speed and solids at the rear

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Map of Boston and the surrounding territory showing the location of the Clearing House company's plant and the zones in which it makes deliveries. There are in reality three zones of 4, 8 and 10 miles radius from the plant, the town of Dover being the only point served beyond the 12-mile circle shown. The area within the 12-mile circle includes practically the heart of the most populous suburban territory in the entire United States

liable to have capacity or nearly capacity loads on every trip, due to the fact that its parcels are received from more than one store. If few packages are received from one store on any certain day, it is likely that a larger number than usual may be received from some one of the remaining stores, and in this way make up a capacity load.

Why Some Companies Have Failed

Many companies formed and operated for the work of delivering the packages of several department stores, etc., have failed because their trucks were not maintained properly, or because the profits obtained through efficient truck operation were eaten up by poor interior-handling methods. Men who seek success in the formation of such a company must be not only experts on truck operation, but also experts on department store package-handling systems. Firms whose men have one of these accomplishments and not the other are not liable to succeed.

Even with men who are experts on both the care, operation and maintenance of trucks and on interior systems, the development of such a delivery concern should be gradual. It should not start out on a grand scale. If it does, other conditions such as the fluctuation of business due to the various seasons, the change in the methods of routing caused thereby, and even changes in the interior methods of handling the parcels, are liable to spell disaster. Again, price readjustments are often found necessary after a year or more of operation. These are more readily made on a small fleet than on a large one.

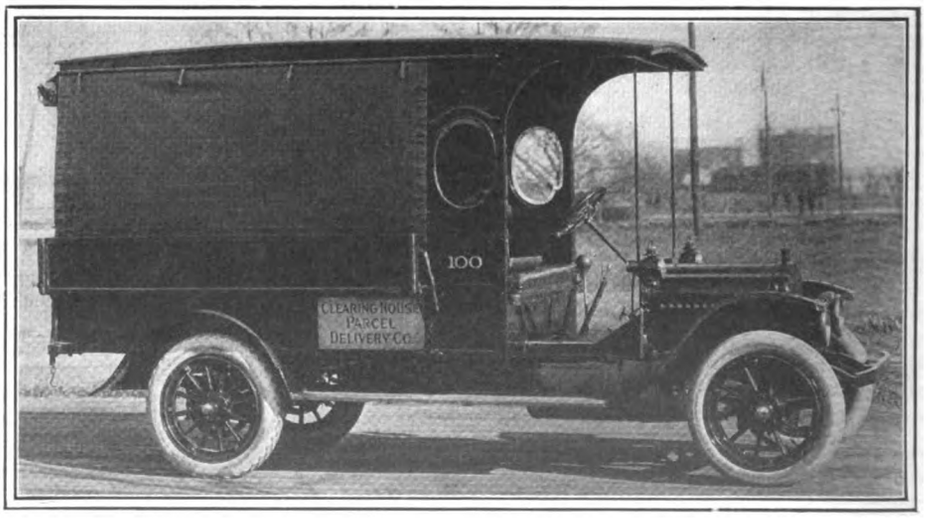
Parcel Delivery Company 3 Years Old

The Clearing House company has been in business almost 3 years. It maintains a fleet of fifty trucks, which it uses to collect and deliver parcels from more than a dozen Boston dry goods, drug and clothing stores. Its radius of delivery extends 10 miles from its plant. The area included in a circle of this diameter includes practically the heart of the most populous suburban territory in the entire United States. This holds true, notwithstanding that a portion of the area included in such a circle takes in a large section of Boston harbor and the Atlantic ocean on the east. This area is shown graphically in the map on this page.

The Clearing House company was formed in February, 1914. It planned to start on a grand scale. While it had adequate knowledge of the interior handling of packages by means of systems such as are used in the large Boston department stores, its information regarding motor trucks and their operation was not sufficient.

Some of the trucks purchased were not exactly suited to the work to be done. In addition, they were not properly routed, inspected and looked after in a manner which would insure their successful operation. Because of this the vehicles gave much mechanical trouble. As was to be expected under these conditions, the trucks were laid up more often than they should have been. One or more trucks were almost always *hors du combat*. If parts for one could not be obtained in time to put the vehicle back in service on the date required, that particular part would be taken from some other truck which was laid up for other reasons. This was not efficient operation. It was robbing Peter to pay Paul. Naturally, this cost money. Consequently the concern did not at first obtain the success which it should have.

Since that time, however, many changes have been made in the organization of the company insofar as the men in charge of the trucks are concerned. The fifty vehicles which make up the company's fleet are now under the direct supervision of a truck expert. Each truck gets a thorough inspection every 15 days. In addition to this semi-monthly overhaul, the drivers must report the slightest trouble with



One of the ten 1,500-pound Whites used for the final delivery of the packages from the Clearing House plant to the customers. Note the type of roll-curtain body employed and the trough-like boxes with open ends on each side for carrying long articles, such as rugs, brooms, curtain poles, etc.

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the truck each night before they leave it in the garage.

Lubrication Troubles Overcome

Previously much of the mechanical trouble experienced with the trucks was due to lack of lubricating and greasing. This trouble has been overcome by hiring one oiler and one greaser, who work at night and are responsible for the proper greasing and oiling of the entire fleet. To keep tabs on the greaser and oiler the superintendent picks out one truck at random each day and makes a careful inspection of it to see that all parts needing lubricating and greasing have been attended to. In this way the workmen are always kept on their mettle.

Each night every one of the drivers fills out a garage tag stating what particular parts of his truck, if any, have given trouble during the day. The garage mechanics take these cards and after completing the work as called for, check off each item and sign their names to the cards. This system tends to eliminate overlooking any of the items on the card and also links up the job done in each case with the man who did it. If the work done should prove unsatisfactory it is a simple matter for the garage superintendent to discover which man is responsible for it.

Besides the oiler and the greaser, the night working force consists of two washers, one mechanic, his helper and a watchman, a total of seven for a fleet of fifty vehicles. All of the minor repair work is done by the night mechanic and his helper. The overhauling and major repair work is done in the day by two mechanics, one helper, one tire man and one janitor, who keeps the plant clean. The sole duty of the tire man is to keep the pneumatic tire casings and tubes in repair and take off and fit the solid tires. Exclusive of the day janitor and night watchman and the two washers, the force found necessary for the proper maintenance and repair of a fifty-truck fleet consists of eight men.

The close supervision by the expert truck superintendent, the nightly inspections by the drivers, the checked-off work as done by the mechanics and the responsibility for the daily greasing of the vehicles have resulted in a large increase in the time in actual service of each truck.

Thus the company is now well equipped in that part of the business in which it was lacking formerly. It is prospering accordingly.

The Operating Plan Is Simple.

The plan of operation of the Clearing House company is simple. It consists of picking up the packages from the stores of its customers and hauling them to its plant. This is located in the Back Bay section of Boston. There the packages are sorted and placed into bins by a system similar to that used by department stores. The packages to be delivered in one certain area are placed in a certain bin. Similarly those for other areas are placed in other bins. Each bin corresponds to a route covered by a certain truck. Several times a day, depending on the number of times any particular area is served, the truck which runs on that route backs up to its bin. The packages in the bin at that time are then loaded into the vehicle. After suitable records have been taken of the number and destination of the packages, the truck leaves the plant and delivers its goods just like the vehicle of any department store.

The company has 150 customers from whom it collects packages. These include department stores, 5 and 10-cent stores, clothing stores, drug stores, jewelry stores, shoe stores, etc., etc. No groceries, meat or green goods are handled. Among the department stores which use the Parcel Delivery company's service are the Shepard-Norwell Co., William Filene's Sons Co., the R. H. White Co. and the Magrane-Houston Co. The twelve Riker-Jaynes drug stores in Boston also use the service.

In all, fifty trucks, including one Ford delivery car and a rebuilt Alco taxicab, are used to collect and deliver the packages from the company's 150 customers. Seven of these are used exclusively in the pick-up work, that is, the haulage of the goods from the various stores to the plant. The remaining forty-four trucks are used on thirty-nine routes, four of the vehicles being maintained for spares and for special delivery jobs.

The present fleet consists of two 2-ton Autocars, five 1½-ton Darts, one 1½-ton White, twenty-eight ¾-ton Stewarts, ten 1,500-pound Whites, two 1,000-pound Vims, one Ford delivery vehicle and a rebuilt Alco taxicab with a rated carrying capacity of 1,500 pounds.

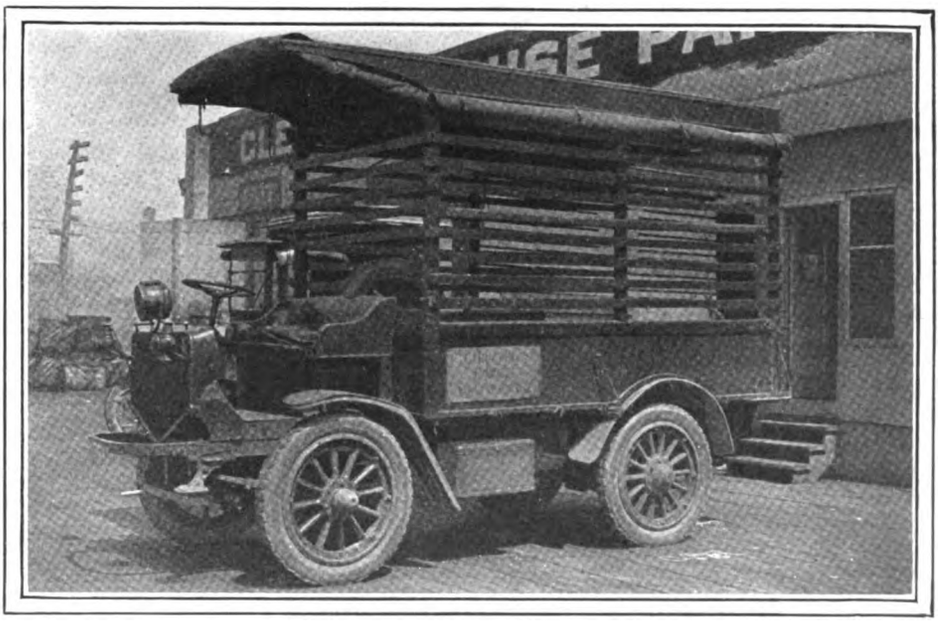
The trucks used in the pick-up work are all 2-tonners, one Autocar, five Darts and one 1½-ton White. Those used for the final deliveries from the plant are all 1,500-pounders with the exception of one 2-ton Autocar. The 1,500-pound trucks include twenty-eight Stewart of Buffalo vehicles, ten Whites, two ½-ton Vims and the rebuilt Alco taxicab. All of the 2-ton trucks are equipped with pneumatics in front for speed and solids in the rear. All the 1,500-pounders are pneumatic shod.

The pick-up trucks work within a radius of from 1 to 2 miles of the plant, practically all of the stores which are customers being located in down-town Boston. The final delivery vehicles serve the entire area within a circle drawn about the plant as a center with a 10-mile radius.

The circular area is divided into three zones, within 4, 8 and 10 miles from the plant, respectively. Two to three trips are made daily in the 4-mile zone and two trips daily in each of the others. The third trip in the 4-mile zone is made with special deliveries. The trips in each zone are arranged to correspond with the times of arrival of the pick-up trucks at the plant and also with those of trips in the remaining zones.

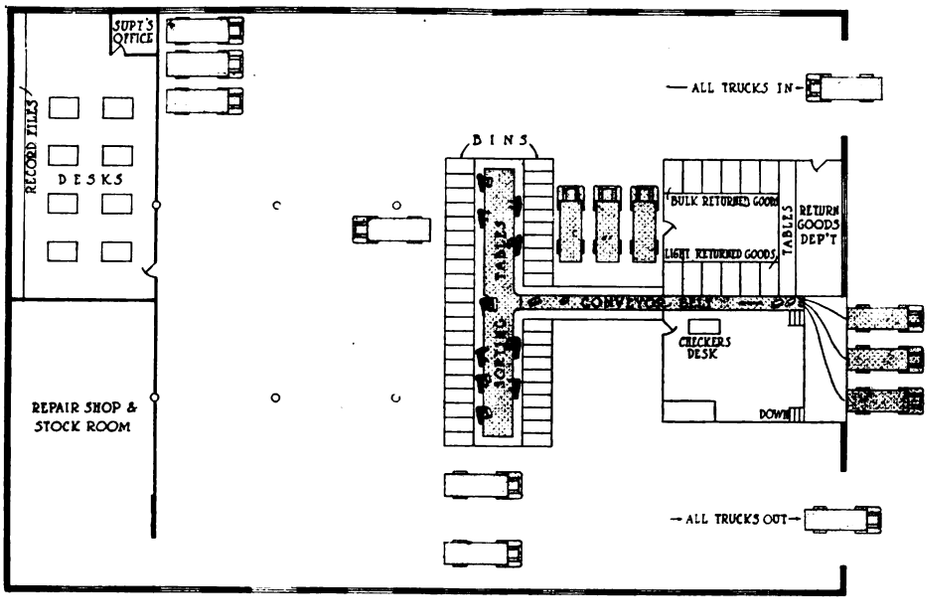
The pick-up trucks make five trips per day. The trucks on the first trip are due to arrive at the plant at 9:15 a.m. The other times of arrival are: 11:30 a.m., 2:30, 3, 5 and 6 p.m.

The delivery trucks which work within the 4-mile zone leave the plant at 10:30 a.m. and at 4 p.m. The trucks



One of the two Autocars owned by the Clearing House company and used in the pick-up work. Note that it is fitted with pneumatics all around. Note also the type of body used and the spare tire carried inside just aft of the driver's seat at the right

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Plan of the plant lay-out showing the division of the floor area into the office and repair shop and stockroom at one end and the delivery department in the remaining space. Note the wide platform at which three of the pick-up trucks may unload at once. Note how the conveyor leads from the platform directly to the center of the sorting bench surrounded by the route bins in the form of a hollow rectangle. Directly behind the unloading platform are partitioned-off spaces for the returned goods and for the checker's desk and call-order clerk. Note how the trucks all enter one door on one side and leave through that on the other. Notice also how two trucks can pass with ease between the end bins and the side walls and the large area available for maneuvering in or out of position at the bins

working in the 8-mile zone leave the plant at 9:30 a.m. and 3 p.m., these times being arranged so as not to conflict with the leaving times for the other routes in order to reduce the congestion at the plant. Special trips are made besides those given where necessity demands.

The Towns Served

The points, towns or cities served which lie within the 4-mile zone include Boston proper, Brookline, Roxbury, Jamaica Plain, Dorchester, Brighton, Somerville, Cambridge, Charlestown and South Boston.

Those within the 8-mile circle include Norfolk Downs, Wallaston, Quincy, Newton Upper Falls, Newton Highlands, Newton Center, Newtonville, Newton, Watertown, Belmont, Medford, Arlington, Malden, Delham, Hyde Park, Milton, Mattapan, Everett, Winthrop, Revere, East Boston and Chelsea.

In the 10-mile zone the following towns receive two deliveries each day: Needham, Wellesley Hills, Newton Lower Falls, Auburndale, Waltham, Melrose and Winchester.

7,500 or More Packages Daily

An average of between 7,500 and 10,000 packages are delivered every day in the entire area included within the 10-mile limits. With thirty-nine to forty-three trucks at work in the final delivery end of the business, the average number of packages delivered per day per truck is between 250 and 300.

For this service those of the Clearing House company's customers who have 500 or more packages per day to deliver pay a flat rate of 8c. per package, no matter whether they are delivered in the 4 or the 10-mile zone. Those of the customers who have less than 500 packages per day pay at the rate of 10 cents per package anywhere within the 10-mile limits. In addition to these rates, the company delivers perishable express shipments within the same limits at 15 cents per package. This class of goods does not include green stuffs, but such articles as expensive silks, vases, etc., less than 50 pounds in weight, which might easily be damaged by rain or broken in handling.

Besides those customers from whom the Clearing House company's trucks pick up the packages, the company also sells to others $2 books of 5 and 10-cent stamps. These latter concerns attach a sufficient number of stamps to the parcels to be sent. These parcels are collected, the stamps cancelled and the packages put in their proper route bins, after which they are delivered in the usual manner.

Special Charge for Valuable Goods

The company's liability per lost package is $50. If the goods in any packages is worth more than $50, it must be so stated on the wrapper and an additional charge paid according to the value. These additional charges are paid for in so many counts, a count being worth 10 cents. The number of counts corresponding with the value of the package is marked on the package wrapper by the customer. Thus if a customer delivers a package worth $100 into the hands of the Parcel Delivery company, it must have two counts if he is to collect the full $100 if the package is lost. Otherwise the maximum sum which could be collected if the package were lost would be $50. To insure full payment on lost packages valued at more than $100, one count is necessary for each additional $100 above that amount. Records are kept of these counts for each customer and at the end of the month they are added to the charge at the rate of 8 or 10 cents per package, as the case may be.

All Employes Bonded

To protect itself against serious loss due to theft, the Clearing House company requires every one of its drivers to be bonded to the extent of $500. All the clerks in the plant and everybody through whose hands the packages pass must also be bonded for a like amount. The concern also uses one helper on each of the delivery trucks and sometimes two during the busy seasons. In the latter case, the helper is used primarily to conserve the truck time by speeding up the delivery. Otherwise, the one helper acts more as a guardian for the goods in the truck. Helpers must also be bonded at $500 each. Due to these precautions the losses which must be paid by the Clearing House Company are small.

The drivers are paid a flat rate of $18 per week and the helpers $10. In case a



Longitudinal cross section taken on the centerline of the conveyor showing the relative position of the conveyor belt, the sorting table, the master sorter on the left and one of the routers and bookers on the right, the route bins and the truck backed up to one of the bins to be loaded

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driver has to work after hours he is paid $1 overtime and the helper 50 cents.

The Clearing House Company's plant is located in the upper floor of a garage building directly in back of the American League baseball grounds. The garage on the ground floor is an entirely separate organization and has no connection with the Clearing House Company. The latter's second floor is reached from the street by a wide ramp.

The Plant Layout

The floor, which is rectangular in plan, is divided into two parts by a glass partition at the back or end farthest from the entrance. At the front end there is a large door at the center and a smaller door on each side of it. The center door opens onto a platform on which the packages brought to the plant are unloaded. From there they are put on a belt conveyor which extends about halfway to the other end of the floor. At the end of the conveyor and perpendicular to it is a sorting table. This is surrounded by conventional route bins such as are used in most department stores. These form a hollow rectangle about the sorting bench except at the point at which the conveyor touches it. As shown in the sketch on page 8, these bins do not take up the entire floor area but are so arranged as to leave sufficient space around them to enable each of the delivery trucks to enter the building and back up to its particular bin. The latter trucks are wholly within the building while being loaded and enter through the door on one side of the unloading platform and leave through the similar door on the other. When the truck nearest the incoming door is backed up to its bin there is still sufficient room in front of it to allow the trucks which must run to the adjacent bins to pass in front of it. Similarly any one of the trucks may pass in front of those nearer the exit door without disturbing them on its way out.

Vehicle Congestion Eliminated

All of the bins face the sorting table except at the ends of the latter where the outsides of the two sets of end bins facing each other are joined. This completely encloses the bins and makes it impossible for the drivers to have access to them. Between the sides of each set of end bins and the corresponding side walls of the building there are clear runways of 30 feet. These runways are sufficient to permit two vehicles to pass. This eliminates delays due to vehicular congestion coming in or going out.

The rear end of the floor is divided off by the glass partition which extends part way across the building. The space behind is used as the office. There is also a small repair shop at the same end. In it are carried oil, grease, waste, etc., and small parts such as are required for minor repair jobs. All work of this nature is done on the trucks as they are backed up into position against the bins during the night.

The pick-up trucks run up the ramp leading to the plant with their loads of packages collected from the various stores and back up to the doors of the large platform inside of the building. Three vehicles can unload at once. This platform is level with the floor of the truck body and enables the packages to be unloaded easily onto the end of the belt conveyor. After the packages are deposited on the conveyor near the door end they move along to the sorting table where they are separated by a master sorter who throws them to the right or left. From there they are picked up by men who act both as sorters and bookers and placed into bins which surround the sorting table. An average of ten sorters are employed to handle the 7500 to 10,000 packages delivered daily.

As the pick-up trucks back up to the unloading platform to deposit their loads a checker who has a small stand desk near the door end of the conveyor counts the number of packages as they pass him on the conveyor. He also notes the company from which the packages come. These figures are used to check against those of the drivers and those of the companies sending the packages. They are also used to determine the total number of packages entering the plant in any given day. The total number received by the checker's count should tally with those taken out by all the drivers during that day.

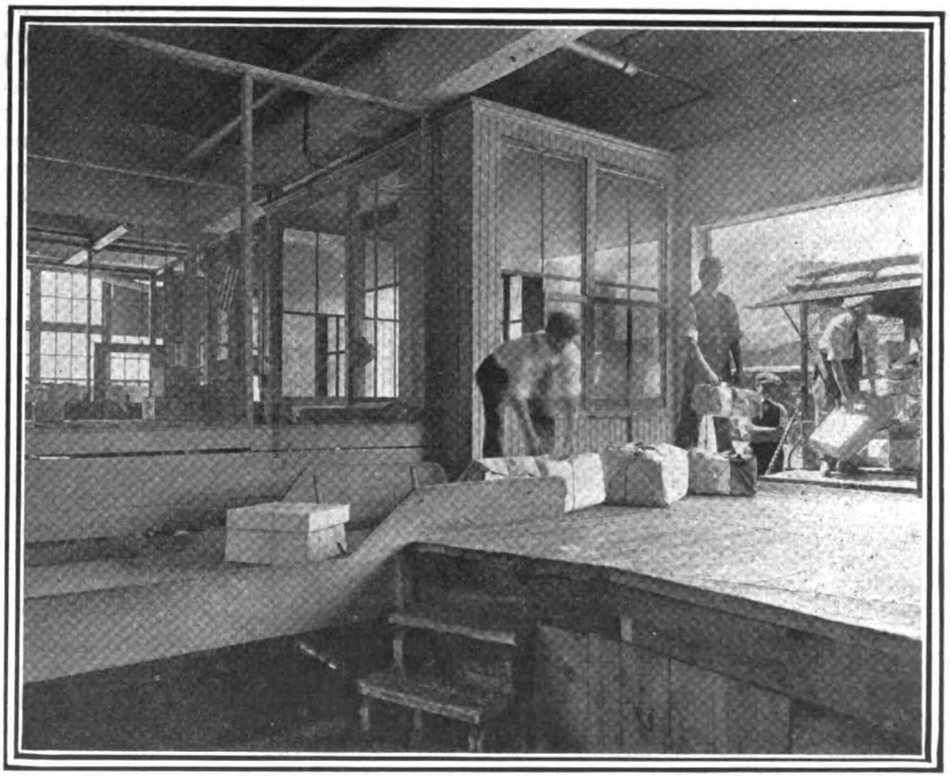
After the packages have been sorted and placed in their proper route bins the sorters act as sheet writers or bookers. Each package or bundle of packages to be delivered on any particular route is entered on a large sheet on which the name of the Clearing House customer is written, the name of the consignee and his address and the number of pieces in the bundle if there is more than one package. This sheet differs from the ordinary department store route sheet in that the name of the Clearing House company's customer must be stated in order to check up on the number of packages delivered for the particular customer on any trip.

Route Sheets Kept as Records

This route sheet is made out in duplicate. One copy goes to the auditor of the company and the other to the driver. The latter signs the sheet to indicate that he has received the number of packages stated thereon after he has used it as a guide in loading his truck in the order in which the packages are to be delivered. The C. O. D. packages are written up on separate sheets in triplicate, copies going to the driver, the auditor and the route book in the office.

After the delivery has been completed the driver turns in his returned goods and has them signed off his sheets and then turns in the cash from C. O. D. collections to the cashier.

The route sheets are then filed in the



View taken from the inside of the unloading platform showing one of the pick-up trucks in the act of being unloaded. Note the platform end of the conveyor at the left and the steps leading up to the platform. In the background may be seen the returned-goods department suitably partitioned off by means of wire netting on wood framework

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superintendent's office in a large horizontal cabinet. This is divided into 372 separate drawer compartments in twelve rows high and thirty-one rows long. The twelve rows high are for the 12 months of the year and the thirty-one rows wide are for the days of the month. All of the sheets for any one day during the entire year thus have a separate compartment of their own. Furthermore, the record of each day's deliveries can be readily got at. This facilitates claims for lost goods and enables the records to be found easily.

This system, together with the triplicate forms of sheets and the check against the number of packages which pass by the checker near the door end of the conveyor, proves an efficient means of keeping the records balanced. As a further check, reports are made to the office of the mileage of each truck, the number of packages taken out and the number brought back.

Success in the common delivery of parcels from many stores by motor trucks of a delivery concern is dependent upon the most efficient operation of the trucks without and the most efficient handling system within.

How Shall the Roads Be Saved?

Unfit Roads Succumb to Modern Volume of Traffic Faster Than They Can Be Rebuilt—States Would Levy Truck Tax

The Problem

State roads in the populous states are wearing out faster than the increase in road funds permits of their repair and replacement by better types.

Motor trucks are popularly supposed to be the most destructive class of vehicles to the roads.

Prevailing types of road surfaces are not capable of withstanding the traffic to which they are subjected due to its rapid increase in volume through greater use of motor vehicles.

POPULAR opinion in the great trucking centers, comprising the States of New York, New Jersey, Maryland, and California, seems to be that motor trucks are not at the present time taxed sufficiently for their wear and tear on the roads. This tendency has resulted in the formation of commissions in each of the above states to determine upon a new schedule of motor truck fees to be based on the damage to the road by such vehicles.

All of the present agitation for increasing the fees for commercial vehicle operation seems to be based upon the assumption that the conveyances using the roads and streets should pay for them in proportion to the damage they cause thereon.

More Money Needed for Roads

This viewpoint has been caused by the rapid deterioration of the present thoroughfares, which were not constructed for and can never stand the vastly increased traffic which now flows over them. This traffic has increased much faster than the revenues for maintaining such roads until new and more durable types can be constructed. It is admitted by the engineers who have laid out city streets and highway engineers in charge of town, county, or state roads that practically all such thoroughfares built in the past are inadequate to stand the great stream of traffic which the tremendous growth of the motor vehicle has induced.

Under these conditions the roadway engineers have been at their wits' ends to keep such roads in a passable shape until new and more costly types could be built with the cash appropriated. Under the general assumption that motor trucks do more damage to roads than other types of vehicles, due to their greater weight and size, the engineers' recommendations have been for increased taxation on such vehicles alone. Accordingly, all of the commissions so far created have been empowered to consider no type of vehicle except the motor truck and to base such new fees as they may recommend upon the relative damage caused by such vehicles.

The New York State Commission, which is formed of the State Engineer, the Commissioner of Public Works and the Highway Commissioner, held its first public hearing at Albany, N. Y., on November 21. That commission has not yet proposed any new schedule, so that the first hearing before it resulted principally in bringing to light suggestions by owners and operators of motor trucks.

Among the most important of these was the fact that roads should be classed as governmental or state institutions, benefiting alike those who use them and those maintaining plants in the area served, or those who own real estate in the same territory. It was pointed out that persons who call the fire engines when their houses are burning are not taxed especially for that purpose, nor are they taxed when they happen to call policemen to protect their property from theft or damage. The contention was made that roads play a most important part in the economic development of the state or nation at large, and that their cost of construction and maintenance should, therefore, be borne by the state or nation at large, and not by those who run their vehicles over them.

Road Tax for All Vehicles Wanted

While these motor truck interests would not admit of the taxation of motor trucks for road maintenance revenue, they maintained that if any law should be passed basing fees upon the extent of use and wear and tear of roads such law should include all forms of vehicles, including passenger cars and horse wagons, as well as motor trucks. It was also pointed out that if motor trucks are taxed, and not the other types, such a provision would become unconstitutional, because it would be class legislation of discriminatory nature.

The impossibility of living up to the word of the New York State law, which specifically provides that the new schedule of fees be based upon the extent of use and the amount of wear and tear, was brought out by the fact that any such determination along scientific lines would require a tremendous amount of experimentation of various kinds of vehicles operating over various classes of roads at various times of the year, if possible even then.

The Dénouement

Taxation of motor vehicles beyond the cost of registration is unconstitutional.

Taxation of one class of user of a common utility and not others is unfair.

Motor vehicle fees in New York State are 20% of expenditures on roads.

Most motor trucks never use state roads.

Taxation of motor trucks means higher cost of transportation and of living and would block progress.

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The question of speed determination, the weight of the total vehicle and load, and the kind of tires would also have to be considered, together with the length of time that each particular vehicle would be liable to be in operation over the road under the jurisdiction of the state.

City Trucks to Be Exempted

In this connection it was averred that, whereas the proposed fees to be charged motor trucks in New York State could only be used for the maintenance of roads under state control, trucks which did not use the state roads, and therefore could not damage them, would, therefore, have to be exempted from any such fees. It was also pointed out that approximately half of New York State's motor trucks are owned in New York City and very seldom use the state roads, and that approximately 75 per cent of all the trucks in the state were operated in large industrial centers or cities and do not traverse state roads except at irregular periods. Motor buses, it was argued, are under the supervision of the Public Service Commission and so have to pay additional taxes at the present time, and that they should be exempted from any new increases.

Physical characteristics of the electric truck, as compared with the higher speed gasoline vehicle, was urged as reason that some consideration should be taken in regard to its proportional wear and tear on the road.

Some interests stood on the principle that all vehicles should be charged a certain fee to cover the cost of registration for identification only, and that any additional tax to help pay for the cost of construction and maintenance of roads should be placed upon all vehicles, and not alone upon motor trucks or any other single class.

New Jersey's Proposals Reconsidered

The New Jersey State Commission, which is formed of the engineers of the various counties, acting under the supervision of the State Commissioner of Motor Vehicles, is seeking to preserve the present roads until such time as new roads can be built to carry the vastly increased traffic now passing through the state. This commission, like the one in New York, has its powers limited to the taxation of the motor truck alone, and it cannot decide upon any similar tax for horse vehicles and cause them to pay their share of any road damage.

The New Jersey commission held its first public hearing at the court house in Newark on October 2, at which time a preliminary proposed set of regulations was presented. These sought to limit the weight, size, and speed of trucks, and contained two provisions which would have made it practically impossible to operate trucks in that state. One provision called for the use of waybills by each commercial vehicle driver, showing the amount of load carried by the vehicle at any particular time. The other sought to make it necessary to carry a complete spare wheel and tire to prevent road damage should the tire on the vehicle become injured in any way so that its rim came in contact with the road surface.

The impracticability of these two provisions was soon manifested to the committee, which eliminated them before the last public hearing, held in Newark on November 24.

The California Motor Vehicle Department held a meeting in Sacramento, November 21, to consider a new motor vehicle bill to be presented to the legislature at its last session, in which it was sought to limit the size, weight, and speed of motor trucks. Prior to this conference meetings were held by the supervisors of the seven southern counties of the state, who reached conclusions which have been severally criticized by motor truck owners and operators. The latter claimed that the supervisors had utterly failed to recognize the economic trend of motor truck development, and that proposed restrictions limiting the weight, size, and speed of motor trucks would stop future progress and hold down efficiency to the present-day level.

Motor Truck Legislation Pending in Four States and Canada

NEW YORK STATE—The New York State Commission consists of Edwin Duffey, Highway Commissioner; W. W. Wotherspoon, Superintendent of Public Works, and Frank M. Williams, State Engineer. It came into being by an amendment to the highway law of the state approved by the governor and passed on May 19, 1916.

It is given the task of adopting a new schedule of registration fees for motor trucks and motor buses fixed upon the basis of the time and extent of their use of the public highways and the relative wear and tear of the public highways by reason of their use thereon. The new schedule is to be filed with the Secretary of State not later than January 1, 1917, and is to go into effect February 1, 1917. The new schedule will supersede all previous registration fees for motor trucks and buses.

The first preliminary hearing held by the commission took place at Albany, N. Y., on November 21. It is expected that the next public hearing will be held in New York City, at which time it is hoped that some printed form showing the commission's intention will be distributed for study and perusal.

NEW JERSEY—The New Jersey Commission consists of the highway engineers of the counties, acting under the supervision of Motor Vehicle Commissioner William L. Dill. The personnel of the committee is as follows: Thomas J. Wasser, chairman; Frederic A. Reimer, secretary, and John J. Albertson, Garwood Ferguson and Alvin Fox. It held its first public hearing in Newark, N. J., on Oct. 2, and its second at the Newark Courthouse on Nov. 24. From the suggestions made at these two meetings it will recommend by Dec. 1 a new set of registration fees for motor trucks.

This recommended schedule will go before the next New Jersey legislature for consideration and if passed will go into effect Jan. 1, 1918.

It is the intention of the committee to limit the speed, size, and weight of motor trucks and to prohibit the use of steel tires on motor trucks or trailers of any description. It also seeks to make it mandatory that all motor trucks, whether electric or gasoline, be equipped with sealed governors to limit their speed on level ground. It would also seek to eliminate overloading by the employment of a metal plate on each motor truck chassis giving the maximum weight of truck, body and load and the maximum speed in miles per hour, the figures given on this plate being sworn to in an affidavit at the time the license for the motor truck is taken out. Said affidavit must also state that the maximum weight and speed as set forth on the chassis plate will not be exceeded.

The commission would also place all commercial vehicles mounted on pneumatic tires in the passenger car classification under which they would be taxed according to their horsepower and not by any of the regulatory motor truck provisions mentioned above.

The proposed restrictions as first announced by the committee on Oct. 2 increased the fee of a motor truck whose gross weight is between 25,000 and 25,875 lb. from the present fee of $25 to $112.50 per year. The chairman of the committee stated that this maximum fee and those for lighter vehicles would probably be reduced somewhat in its recommendation to the legislature.

CALIFORNIA—The California state motor vehicle department, headed by H. H. French, held one public hearing on a new proposed schedule of fees for motor trucks in Sacramento on Nov. 21. At this writing it is not known when the next hearing will take place. Among the recommendations made it was suggested that the gross weight of any vehicle and load shall not exceed 24,000 lb., and that only one trailer be allowed, its gross weight with load not to exceed 7000 lb. and that no vehicle or load be over 8 ft. wide.

DELAWARE—The State of Delaware has notified the State of Pennsylvania that it has passed an amendment to the reciprocity law existing between the two states which will exclude commercial vehicles and that all Pennsylvania motor trucks must be registered in Delaware as soon as they cross the state line. Similarly Delaware motor trucks must secure Pennsylvania licenses if they enter that state. In this manner it is sought to raise revenue for the maintenance of roads in both states.

CANADA—A proposed Canadian law seeks to increase the penalty for all infractions of the motor vehicle regulations from $25 and $50 to $200 and in default of payment to require two months in jail or both fine and imprisonment. The new bill also provides for the dimming of headlights when two motor vehicles meet on any public road and the reduction of speed on such occasion to 10 miles an hour.

The Quebec Government has under consideration a new tariff for all trucks, delivery vehicles, buses, traction engines and other similar vehicles equipped entirely or in part with solid tires in which the fee will be $25 per ton capacity or fraction. At present the law provides for motor vehicles as a whole without regard to their use as commercial vehicles or passenger cars. The present rate, fixed in 1914, provides for a fee of $10 for vehicles with motors having horsepowers of 25 or less, $20 up to 50 hp., and $25 above 50 hp. If the new legislation is made into law it will mean that a 10-ton truck will be taxed $250 per year instead of the $25 at present charged if its motor is of 50 hp. or more. It is stated that the increase in taxation is desired and needed for the maintenance of present roads.

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Long and Short Haul

SHORT railroad hauls are usually long hauls for motor trucks. Railroad transportation on short hauls is expensive. Long truck hauls pay best. It has been demonstrated over and over again that the motor truck can be used for short hauls of freight with greater advantage than railroads.

One of the greatest bones of contention between the railroads and the Interstate Commerce Commission in freight-rate controversies has been the question of long- and short-haul rates. If the railroads had their way the rate on short hauls would be much higher per ton-mile than on long hauls. Instead, however, the compromise rates now in force in effect rob Peter to pay Paul. Long-haul rates are higher than they might be were short-haul rates higher.

A good freight agent will secure for his road the greatest possible amount of long-haul business. Long-haul business is highly profitable. Short hauls are not.

Why not relieve the railroads of this burden of unprofitable service? Let motor trucks handle the short hauls, and leave only the long overland hauls to the railroads.

Here is a virgin field for the investment of capital and brains—a new industry which not only will bring about a prodigious demand for motor trucks but, with proper installation and operation, should prove an exceedingly profitable one, both to the operators of such truck lines and to shippers and receivers of freight, especially that in the perishable class.

There is one thing to watch out for, however, and that is adverse legislation. The railroads will not sit supinely by and see this business grabbed by motor truck operators—and their political influence is great. Already Maryland has had a restrictive piece of legislation saddled upon the budding freight transportation truckers in that state. Others may follow the precedent. Only concerted action can prevent legal restraint of this fair competition.

Taxing Progress

SHALL motor trucks be taxed for the exercise of their constitutional right to utilize the public highways? Shall the progressiveness of business men who use motorized commercial vehicles pay forfeit for the unprogressiveness of the road authorities in failing to provide roads capable of withstanding the requirement of modern traffic? Or, on the other hand, shall we permit our roads to go to pieces under the stress of use for which they were never adapted?

New York, New Jersey, Maryland and California are now conning the merits of the case above stated. What New York and New Jersey do will serve largely as a precedent for action by the other forty-seven states.

It is easy to say that it is unconstitutional to tax a particular class of users for the exercise of their natural right to make proper use of public property.

It is easy to protest against discrimination as between the motor truck and the horse vehicle.

It is easy to refute the claims that motor trucks are essentially road-destroying agents as distinct from all other classes of vehicles.

And it is easier still to compromise and postpone the final issue.

But none of these things will change the fact that in the great trucking centers roads are deteriorating more rapidly than they can be repaired and that whether the fault lies with the state highway departments which failed to foresee the needs of traffic when these faulty roads were laid at great public expense or not, we must conserve such roads as we now have while working for more adequate roads in the future.

Hasty conclusions lead to hasty action and this is no time for ill-considered moves. But the situation that now confronts truck users in the middle Atlantic states is a grave one and country-wide in its significance. There is not much time left in which to act, but deep thought must precede any action if permanent good is to result.

It is the part of wisdom for all interests involved: the users of trucks, the dealers in them, their manufacturers, clear down to the man in the street who must foot the bills if haulage costs are increased; to give the subject earnest study and prepare to take definite action to insure an equitable settlement of the problem.

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Brakes Are Neglected Design Factor

They Stop Trucks Quickly, But Succumb to Long Coasts

PHILADELPHIA, PA., Nov. 23—Retardation, according to John Younger, chief engineer, truck department, Pierce-Arrow Motor Car Co.; is of greater importance than acceleration from the all-important standpoint of safety, and has received altogether too little attention from motor vehicle engineers. There is great need for brakes which will stay reasonably cool in descending long grades and for a nicer adjustment of effectiveness to the characteristics of the work to be done and to the ability of the driver.

These views, together with much invaluable data on brake design and dynamics, were brought out in a paper presented by Mr. Younger at the meeting last night of the Pennsylvania Section, Society of Automobile Engineers. In the discussion it was suggested that a return to the metal-to-metal brake may be necessary and that brake-linings were generally remiss in their radiating ability.

"The automobile death-rate," significantly declared the speaker, "increases in inverse proportion to the efficiency of the retardation curve." Brakes serve two offices, he further pointed out; to stop the vehicle and to restrain its speed in coasting. The one is comparatively simple; the other an unsolved enigma.

Among other very interesting data submitted was the figure 6 feet decelleration per second per second, as the normal retardation and 10 feet the maximum. For the same reason that the speaker condemned four-wheel brakes diagonal braking, that is, each set acting on one front wheel and one rear wheel, was advocated in discussion. This is because with both wheels on an axle sliding they lose all of their ability to maintain the correct direction of travel. Naturally with all four wheels locked, the driver is likely to lose control of both front and rear wheels.

"The truck is often twice as heavy when loaded," Mr. Younger stated in pointing out why the braking problem for commercial vehicles was more baffling than in the case of passenger types, "and overloading to the extent of double the rated amount may occasionally be met with, though the evil is, I think, getting less." Continuing, he said:

> "There are still a few trucks whose load is more or less balanced between front and rear wheels, but they are in the minority. The load is most usually carried 75 per cent and upward on the rear axle, and it is this the designer must pay attention to. The weight of a truck is in no proportion to its load. A 2-ton truck with body may weigh upwards of 6,000 pounds, or 1.5 times its load, whereas a 5-ton truck with body may weigh 10,000 pounds or equal to its load.
>
> "Each truck therefore must be considered individually and the final braking effort on the circumference of the rear wheels may be made equal to at least 0.5 times the loaded weight at the rear wheels. Assuming the speed of the truck at 15 miles per hour, this will stop the truck in about 30 feet without causing the load to pile up behind the driver's seat. This should be short enough for any board of councilmen, and should preclude the necessity for providing safety guards or fenders."

Account must be taken of the weight of trucks in descending grades, for with its increased potential energy in coasting a truck presents a braking problem very similar to that of a touring car going at its relatively greater speed, for the deficiency of kinetic energy is compensated for by the surplus of potential energy. In retarding speed without stopping the vehicle the problem becomes one of absorbing energy, which means dissipating heat. As an instance Mr. Younger cited:

> "There are many hills 10 per cent grade a half mile long. A 5-ton truck, gross weight 20,000 pounds, has a gravitational component downhill of approximately 2,000 pounds. Assuming a road resistance of 50 pounds per 2,000 pounds, or 500 pounds gross, we have a net force tending to accelerate the truck downhill of 1,500 pounds.
>
> "If a safe speed of 10 miles per hour is maintained the time of descent is 3 minutes. The energy absorbed by the brakes is 1,500 x 2,640 foot-pounds.
>
> "Or at the rate of 1,320,000 foot-pounds per minute.
>
> "Or 1,700 B.t.u.'s per minute."

This, he went on to show, causes the generation of high temperatures, which ordinary brakes are unable to withstand in mountainous country where hills of exceeding length are encountered. He recalled the Saurer air brake, operated by sliding the camshaft longitudinally, and thereby transforming the engine into an air compressor, of Swiss water-cooled brakes and of various forms of hydraulic brakes that have not succeeded. A third brake for hill work was advocated by the speaker.

A. Ludlow Clayden, engineering editor of *The Automobile*, called attention to the fact that the brake-linings were very poor conductors of heat and that abroad good success had been achieved with brakes of striated compositions, alternate striations being of metal, either iron or phosphor bronze and asbestos fabric. He also called attention to the merits of diagonal braking.

L. Goldmerstein, editorial staff, *A. S. M. E. Journal*, pointed out that the conductivity of brake-lining varied with its texture, loosely-woven fabrics being the better conductors. He advocated a hydraulic brake with a cooling arrangement.

E. R. Whitney, chief engineer, Commercial Truck Co., Philadelphia, advocated brakes that require considerable pressure to operate for trucks, as truck drivers, being of great physical power, do serious damage when the brakes grip too easily by jamming them on too suddenly.

Mr. Younger decried brakes with both internal and external sets acting on the same drums, as in this case all of the heat has to be radiated through the edge of the drum. He also advocated grinding drum surfaces to a high polish to promote evenness of wear. He added that he had been puzzled by the fact that loosely-woven brake-linings seemed to give longer wear than the finer textures which apparently were more durable.

Among the most valuable data included in the paper was the following:

Co-efficient of adhesion of average rubber tire on good macadam, asphalt concrete or brick road.....0.5
Average pedal push of man in properly-made seat .....300 lb.
Average lever pull of man.....100 lb.
Efficiency of average brake linkage, allowing for usual poor lubrication..75%
Average rate of retardation.....
.....8 ft. per sec. per sec

Germany's Pedestrians Heedless as Ours

Walker's Rules International Requirement of Safety

NEW YORK CITY, Nov. 16—Eighty-six per cent of all fatal and serious street car accidents that occurred in Germany in 1915 were due to the fault of the injured, as shown by a report of the Assn. of Administrations of German Street and Interurban Lines. This agrees almost exactly with the report of the New York City police department for the same year, which shows that 87 per cent of all vehicular accidents in the streets of the city, in which persons were injured or killed and the causes of which were given, were the fault of the injured.

About one-half of the pedestrians fatally injured by street cars in Germany were children, while one-third of all those killed and injured in New York were under sixteen years of age.

The records indicate clearly that any material reduction of street accidents can be brought about only by educating both adults and children to observe proper caution, by regulating pedestrian traffic, by providing adequate playgrounds for children and forbidding playing and skating in the streets and stealing rides.

Every reasonable means having been taken to prevent the reckless and careless driving of vehicles and operation of street cars, it remains to regulate the pedestrian to protect him against his own carelessness. If all the accidents due to faults of drivers and operators of vehicles were eliminated it would reduce the total number of street accidents only one-tenth.

NEW CHAMPION DELIVERY CHASSIS

CHICAGO, Nov. 27—To manufacture ½- and ¾-ton delivery chassis, the Champion Motors Co. has been formed by Cleveland interests in Fulton, Ill. The vehicles are of what is called the *de luxe* type, having electric starting and lighting, bumpers, side-curtains and other detail refinements. They will sell for from $750 to $775.

The plans of the company were first made public last Saturday, when ten of the new chassis were paraded down the main streets of Fulton to arouse public enthusiasm.

W. L. Widlar, N. R. Wildman and William Greif head the concern, which has a capital of $5,000,000. Mr. Widlar is interested in several accessory, lumber, real estate and steamship companies, and is president of the Champion company. Mr. Wildman, vice-president, is a financier of large interests, and Mr. Greif, secretary and treasurer, is heavily interested in a number of Cleveland manufacturing concerns. H. D. W. Mackaye is vice-president in charge of production and designer of the chassis. He has been employed by the Mora, Jenkins, Croxton-Keeton, Metzger, King and Keeton companies.

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Knickerbocker Plans Greater Output

Half Million More Capital—To Build 500 Chassis

NEW YORK CITY, Nov. 24—The Knickerbocker Motors, Inc., has been incorporated in this city to take over the Knickerbocker Motor Truck Mfg. Co., which for several years has made motor trucks in New York City. The new corporation is essentially a reorganization of the old concern on a broader scale and contemplates the production of 500 chassis the first fiscal year.

Herbert G. Streat, president of the Streat Coal Co. and founder of the Knickerbocker Motor Truck Mfg. Co., is president; Arthur C. Brady, formerly president of the Brady-Murray Motors Corp., Chandler dealer in New York City, is vice-president and sales manager; Herbert G. Streat, Jr., son of the president, is treasurer; and Walter C. Guilder, formerly production manager for the Kelly-Springfield Motor Truck Co., designer of the first Garford trucks and early Macks, and also production man with the Timken-Detroit Axle Co., is production manager.

Mr. Streat, Clarence A. Ludlum, Charles H. Class, W. H. Bonynge and Grove D. Curtis are the directors.

The products will be a 2½-ton truck, a 5½-tonner and a 3-ton tractor. Two hundred of the 2½-tonners, 100 of the 5½-tonners and 200 tractors are expected to make up the first year's production.

The concern has an authorized capital of $500,000, all common, $10 par value per share. In a statement by W. A. Lewis and J. B. Linn, underwriting managers, it is stated that $250,000 of this stock will be placed on the market, to be held until it is all paid for, subscribers receiving receipts to be held until it is all subscribed. If, after a reasonable time the stock is not all subscribed, the full amount paid in by subscribers will be returned. It is also stated that none of the capital thus raised will be used for promotion; but will all be devoted to the conduct and expansion of the business.

The concern will occupy the old plant of the Knickerbocker company at One Hundred Fifty-first street and River avenue, Bronx, New York City.

MAKING FRONT-DRIVE TRUCK

WARREN, PA., Nov. 18—C. A. Erickson, formerly with the Scripps-Booth Co., Detroit, Mich., is perfecting two models of a front-drive delivery truck in the plant of the Jacobson Machine Mfg. Co. The light delivery truck which Mr. Erickson is bringing out will carry from 1000 to 1500 lb.

ABBOTT DOWNING, NEW TRUCKS

BOSTON, Nov. 11—The Abbott Downing Co., Concord, N. H., one of the pioneer wagon builders in this country, which recently entered the truck making field, has leased salesrooms in Boston at 84 Brookline Avenue, in charge of F. S. Davis. The company is making two trucks of 1- and 2-ton capacities that will sell at medium prices.

The company will give special attention to truck bodies because of its facilities at its big plant at Concord, N. H. It will continue in the wagon making business also. Until the building is fully completed on Brookline Avenue where its sales and service station will be conducted, Mr. Davis will make his headquarters at 394 Atlantic avenue.

DUPLEX TRUCK CO. FORMED

DETROIT, Nov. 20—The Duplex Truck Co., capitalized at $1,000,000, has been organized to take over the Duplex Power Car Co., Charlotte. The new company will move the business to Lansing, where a site will be purchased and a factory erected.

This company was the first to build an internal-gear-driven four-wheel-drive truck. The Jeffery Quad is built under its license.

Under the new organization H. M. Lee, assistant sales manager of the Reo company, is president and general manager; H. E. Bradner, vice-president; G. W. Hewitt, credit manager of the Reo company, is secretary and treasurer; Harry Harper and Elgin Mifflin, directors of the new company. The officers of the old company were F. P. Town, president; Fred Murray, secretary; H. H. Bryan, treasurer, and F. L. King, vice-president.

MANLY TRUCK IN NEW PLANT

CHICAGO, Nov. 22—A new factory in Waukegan, Ill., a short distance north of here along the lake shore, has been secured by the Manly Motor Truck Co., which recently put the Manly truck on the market. The new plant will be occupied about December 1.

RETURN FROM MEXICAN BORDER

DETROIT, Nov. 20—Roy D. Chapin, president of the Hudson Motor Car Co., and Howard E. Coffin, vice-president, have returned to Detroit from the Mexican border, where they made a study of motor car conditions and of the use of the motor truck and the aeroplane.

Coming Commercial Vehicle Events

Dec. 7-9	Baltimore, Md., Second Annual Convention, Safety First Federation of America.
Dec. 19	Newark, N. J., Monthly Meeting of the Motor Truck Club of New Jersey, New Jersey Automobile Club, 22 Washington Place.
Dec. 19	Philadelphia, Pa., Monthly Meeting, Pennsylvania Section, S. A. E.
Dec. 20	New York City, Monthly Meeting of the Motor Truck Club of America, Automobile Club of America, 247 West Fifty-fourth Street.
Dec. 21	New York City, Monthly Meeting, Metropolitan Section, S. A. E., Automobile Club of America.
1917	
Jan. 9	New York City, Mid-Winter Meeting, S. A. E.
Jan.	New York City, Annual Banquet, M. A. M., Waldorf-Astoria Hotel.
Jan. 10	New York City, Annual Banquet, S. A. E., Hotel Biltmore.
Jan. 13-20	Montreal, Que., Can., Montreal Motor Show.
Feb	Newark, N. J., Passenger Car and Motor Truck Show, First Regiment Armory.
Feb. 3-10	Minneapolis, Minn., Tenth Annual Auto Show.
March 3-10	Boston, Mass., Fifteenth Annual Motor Vehicle Show, Mechanics' Building.

New Moreland Works and Branches

Million-Dollar Building and Export Plants Planned

LOS ANGELES, CAL., Nov. 16—Moreland Motor Truck Co. of Los Angeles, manufacturers of distillate-burning trucks, will erect a new factory plant representing an investment exceeding $1,000,000. Sites for the new buildings are now under consideration.

The Moreland company, headed by Watt Moreland, has been in the business of manufacturing the Moreland distillate truck for about 5 years, and in that time has made and sold about 2000 trucks. The plant now employs more than 250 men, and is one of the largest industrial enterprises in the entire southwest.

Foreign business has begun to be developed in Pacific territory, and the company's expansion projects contemplate means of maintaining closer relations with the foreign field. The Moreland company now has a man in South America investigating the practicability of locating an assembling plant in some city on the west coast, and an assembling plant is to be erected in Tokio, Japan, for Asiatic trade. A third will be located at Seattle to serve the northwestern United States and western Canada.

VELIE MAKERS CONSOLIDATE

MOLINE, ILL., Nov. 20—Consolidation of the Velie Motor Vehicle Co., maker of Velie passenger cars, and the Velie Engineering Co., builder of the Velie trucks, was accomplished at a meeting Nov. 14 under the corporate title, Velie Motors Corp. Capital stock of the new corporation is being increased to $2,000,000, which is accomplished without the introduction of new capital. It is felt that the merger was expedient at this time since it would offer a consolidation of buying power that would in measure offset the present high cost of material. The merger does not affect the Velie Carriage Co., which will continue to operate as a separate institution making horse-drawn vehicles. The personnel of the directorate remains unchanged, as follows: W. L. Velie, S. H. Velie, F. R. Todd, C. V. Rose, F. E. Bradfield, O. E. Mansur and L. E. Nutt.

MILLINGTON CONVERTS REAR-DRIVE TO FOUR-WHEEL DRIVE

CHICAGO, Nov. 22—For the conversion of any standard rear-wheel-driven truck to drive on all four wheels, the Millington Auto Engineering Co. of this city is making arrangements to market a unique converter. The feature of the device is that it does not disturb the rest of the driving parts or the engine, but merely replaces the front axle and attaches to the driveshaft, back of the gearbox.

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The first model of this converter has been built and tested out on a G. M. C. 2-ton chassis. Ninety per cent of the parts of the truck, it is said, are left intact. Negotiations are now under way for a Detroit concern to undertake the manufacture of the product on a royalty basis. Millington also contemplates the production of a $750 front-driven 1,000-pound delivery chassis to be called the Frontaway.

The Millington device, which will be described in detail in a later issue of THE COMMERCIAL VEHICLE, consists of a forged I-beam axle carrying two Timken worm-driven axle shafts, driving the wheels through universals inclosed in the globe-shaped kingbolts and driven by shafts running either side of the engine crankcase to a chain-case back of the gearbox. Here are two M. & S. worm differentials, differentiating between the two front wheels and the front and rear axles. The two shafts are driven by a Whitney silent chain from the main driveshaft.

CHASE RAISES SOME PRICES

SYRACUSE, N. Y., Nov. 21—On two of the Chase models an increase of $75 in list price has been made. These are the 1-tonner, raised from $1,650 to $1,725, and the 1½-tonner, from 1,950 to $2,025. Other prices remain the same as before.

RIKER TRUCKS COST MORE

BRIDGEPORT, CONN., Nov. 24—Prices of Riker trucks will be increased $100 December 1, according to a decision reached by the Locomobile Co., in view of the increasing cost of materials and the scarcity and high price of labor. The 3-ton truck will cost $3,600, formerly having been priced at $3,500, and the 4-tonner will be raised to $3,750 from $3,650.

FORM-A-TRUCK CO. TAKEN OVER

CHICAGO, Nov. 20—The Smith-Form-A-Truck Co., which has been making units for converting the Ford into a truck, has been taken over by the Smith Motor Truck Corp. This practically amounts to a reorganization although the official personnel changes but little. E. I. Rosenfeld, who in reality is the founder of the business, is president of the new company, which is capitalized at $12,000,000, $10,000,000 being common stock and $2,000,000 being preferred. The underwriting will be handled by Michaelis & Co., and the preferred stock will be redeemable at 120. Ground will be broken for an addition to the present plant within 10 days, this addition practically doubling the capacity of the present plant.

WRIGHT ADAPTER NOW WESTERN

SEATTLE, WASH., Nov. 16—An agreement has been reached by the Wright Truck Attachment Co. and the Truck Attachment Co., both manufacturing Ford truck adapters under the name Wright, under which the former concern becomes the Western Truck Attachment Co., and its product the Western attachment.

TRUCK WHEEL CORP. FORMED

CHICAGO, Nov. 21—The American Truck and Wheel Corp. of Chicago, which is capitalized at $1,000,000, has filed charter in Delaware to manufacture motor truck wheels, etc. The incorporators are William C. Loftus, John R. Cavanaugh and Ross J. Cavanaugh.

Jeffery Men to Make Winther Truck

Will Build Three Chassis in New Kenosha Factory

KENOSHA, WIS., Nov. 23—Martin P. Winther, formerly of the Thomas B. Jeffery Co., now the Nash Motors Co., has formed the Winther Motor Truck Co. Mr. Winther was prominently concerned in the development of the Jeffery Quad. A tract of 4 acres just west of this city has been purchased and work on a factory will shortly commence. It is hoped that production on three models, already designed, will commence in April.

The concern has an authorized capital stock of $330,000. Walter D. Rightmeier, formerly assistant truck sales manager of the Nash company, will be sales manager for the Winther company and will also take charge of advertising. Announcement of the new vehicles will probably be made by January.

NEW ACME WORM AXLE

DETROIT, Nov. 10—The Acme Motor Truck Co., this city, is now producing a worm-driven truck axle incorporating, as its principal feature, the M. & S. worm differential. Another feature of the axle is that the brakes, of special design, have a full contact for the entire circumference excepting the small space occupied by the actuating cams.

It is built in a size for 2½ or 3-ton trucks, the standard reduction for this size being 7¾ to 1. The axle is a one-piece steel casting, with the worm gear carried in a separate carrier secured by eight bolts and having the small worm housing and axle bowl cover integral with it. The axle is of the semi-floating type, running on ball bearings throughout. The worm is of the straight type.

BUDD, NEW STEEL WHEELS

PHILADELPHIA, PA., Nov. 16—The Budd Wheel Corp. of this city has been formed to manufacture steel and wire wheels for motor trucks and cars. The concern has a capital of $2,000,000 and occupies a portion of the plant of the Edward G. Budd Mfg. Co.'s plant here. It is essentially a branch of the latter concern, which manufactures steel bodies.

The financing will be arranged privately, the stock being composed of $1,000,000 7-per cent preferred and an equal amount of common. A production of 1000 wheels daily is planned.

TRUCKS MUNITION U. S. FORCES

EL PASO, TEX., Nov. 22—Motor trucks transported the trainload of shrapnel and cannon shells recently received here to Colonia Dublan, the advanced base. There were twenty-seven box cars of ammunition, containing 67,500 shells, packed four to a case.

SWISS MAGNETO IN MONROE

MONROE, MICH., Nov. 25—The Swiss Magneto Co., manufacturer of Swiss high-tension magnetos, has moved from Chicago to this city, having bought out the Elkhart Mfg. Co., and now occupies its factory. The new facilities will enable the production of Swiss magnetos to be considerably increased. No change in personnel will be made. The manufacture of Elkhart magnetos, which were the product of the Elkhart company, will be discontinued, it is understood.

FRENCH DICTATOR RULES TRAFFIC

PARIS, FRANCE, Nov. 19—All transportation in the French republic hereafter, until the close of the war, will be under the control of one traffic director. This official will regulate all traffic and transportation by land and sea, including ships of war and commerce and railroads, motor trucks, motor cars and horse vehicles. M. Oloville, State Railway Director and Under Secretary for Munitions, has been selected for the post, under the title Director General of Transports, and will report directly and solely to the Minister of War.

WILSON ADDS 1-TON TRUCK

DETROIT, Nov. 27—Smaller than the 2-ton single chassis upon which the J. C. Wilson Co., of this city, has heretofore specialized, but incorporating the same general features of design, a 1-ton model of Wilson truck has just been placed upon the market. The new model rounds out the line more than is at first apparent, since with tractors made by shortening the wheelbases of these two models it is possible to embrace practically all load capacities from 1 to 6 tons.

U. S. TRUCKS WITH AMERICAN AMBULANCE CORPS

NEW YORK CITY, Nov. 22—In an article published in the New York *Evening Sun* today is an account of the activities of the American Ambulance Corps with the French army by Leonora Raines, a staff correspondent. This corps is composed entirely of Americans and a goodly portion of the motor vehicles used are of American manufacture. The corps has 170 ambulances and five trucks. Recently the American Relief Clearing House purchased forty ambulances in the United States and two trucks. These are to be fitted with ambulance bodies in Paris and forwarded to Servia, where, manned by Americans, they will aid the wounded on that front.

The American Ambulance expects to increase the number of its vehicles to 250 very shortly and it is more than likely that additions to its fleet from now on will be in the form of American-built vehicles. The ambulances move in fleets of twenty-five vehicles.

The hospital supplies are received from the ships at Bordeaux and Havre. The five trucks used at the Paris base are relied upon to transport such supplies to the various points where they are distributed. Between 400 and 500 hospitals are supplied with American hospital supplies by the Clearing House. At one time last June 8000 cases of supplies arrived at the two ports simultaneously. Most of them were transported by the trucks, although assistance from government trucks had to be secured.

The service has its own dock for the receipt of freight and the trucks are operated all day. In rush seasons they operate day and night.

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Motor Trucking Centers of America—II

CLEVELAND AND BRIDGEPORT

Two Great Industrial Centers Whose Industrial Plants and Living Conditions Make Trucks Necessary

CLEVELAND, O., Sept. 25—When the horseless city becomes a reality, Cleveland, the Sixth City, will be among the first to achieve that proud distinction. She is not horseless to-day, but to the traveler who strolls along her broad thoroughfares she presents in more than one way, the aspect of a motorized city.

In the number of private passenger cars, Cleveland stands fifth, or better than her logical position in respect to size. In motor vehicle manufacture, Cleveland is the second city in the land, motor vehicle manufacture being her third largest industry. In the use of motor trucks, Cleveland is particularly worthy of note.

Not Choice, but Necessity

Necessity has brought about the extensive use of motor trucks and delivery vehicles, since physically there are many factors which tend to prevent extensive motorization. Cleveland pavements are exceedingly rough, although hard and strong, and the plan of the city is that of a small city which has grown large unawares. The center of the Cleveland business area is a large and beautiful public square, which in the aesthetic sense is an asset; but from the practical business standpoint, a nuisance. It divides the business district into widely-separated groups. It renders street car traffic cumbersome and awkward and complicates the traffic problem through extending the distance which must be covered in the course of local business.

Cleveland's streets radiate from this square as a center, and most of the business follows the main thoroughfares, so that the business and manufacturing districts are not in orderly groups, but roughly star-shaped. There is an excellent park system in Cleveland, but it obstructs traffic through its being interposed between industrial sections.

The city is built upon high bluffs, the river front being a considerable distance below the mean street level. The river cuts the city in two, so that there is a business and industrial district to the east of it and another large industrial section to the west. There are few bridges convenient for traffic across the deep ravine in which the river runs, and it is decidedly difficult to carry on traffic between the two sections.

Cleveland's railroads cross it at widely-separated points, so that the factories, mills, etc., are scattered over the city.

But these disadvantages are outweighed by the fact that Cleveland is a city of great distances, since the prevailing mode of living among its citizens is in detached private dwellings, the apartment house so typical of most cities of its size being conspicuously rare. Most of the residences, furthermore, are a good way out, and the tendency is to locate out still farther. Most of the real estate activity is in the semi-suburban subdivisions.

That Cleveland streets are not well paved, as streets go, is due to the excessive mileage of streets for a city of such size. Cleveland has a population of 670,000 and 560.4 miles of paved streets of a total of 853 miles of streets. Cleveland covers 53 square miles.

Great street mileage, due to short blocks and large building lots, and a scattered population make the cost of delivery of merchandise and supplies, such as coal, building material, ice, groceries, furniture, dry goods, etc., high. It also limits the merchant who clings to horse methods to not only a small territory, but a small custom. To do an extensive business in Cleveland requires that a large area be covered by the delivery or haulage vehicles of the business concern, and in this day and age that means motor delivery.

Cleveland's Manufactures

Cleveland is primarily a manufacturing city. She stands first in the manufacture of heavy machinery, nuts and bolts, wire and wire nails, electric carbons and dry cells and malleable castings. She is also first in steel shipbuilding. She is first in the paint industry, and is a leading producer of motor vehicle components.

The stove and lamp industry of Cleveland is important, the Standard Oil Co.'s plant, from which these products are shipped to every country on the globe, being here. White, Peerless, Gabriel and Denmo trucks are made here, as well as some dozen passenger vehicles. Other concerns well known in the motor vehicle industry are the Standard Welding Co., the Parish & Bingham Co., Torbensen Axle Co., Cleveland Worm Gear Co., West Steel Castings Co., Park Drop Forge Co., Service Recorder Co., Perfection Spring Co., Grant-Lees Gear Co., Van Dorn & Dutton, Highland Body Mfg. Co., Hydraulic Pressed Steel Co. and the Willard Storage Battery Co.

Cleveland's iron industry is important, iron and steel being the principal industry of the city.

Truck Purchases Increase 50 Per Cent

The market for motor trucks is steadily getting better. During the present year it is estimated that 50 per cent more trucks will have been sold than in 1915. Much of the ordinary hauling about town is now being done by trucks, the teamsters being forced to adopt more modern methods through their inability to compete with their more progressive brethren who first adopted trucks. Cleveland has been a sufferer from the rebuilt touring car competition, but these are less in favor now than formerly.

Besides resources within herself, Cleveland is the shopping center for smaller centers about her, such as Painesville on the east, Akron to the south and Lorain on the west.

To the south of Cleveland is an extensive agricultural region. In the produce markets of both Cleveland and Akron a marked increase in the number of trucks used has taken place in the last two years. These farmers have learned that it is now practical to drive 20 miles into market and back the same day. Formerly farmers living at such a distance from market had to hitch their horses before daylight and drive all of the forenoon to reach the city before the buying period was over, driving back the next day. Now these farmers rise but little earlier than city dwellers, get to market while buying is still active, and return well before supper time, thanks to the motor truck.

Much of the produce that now goes to the Akron market, due to its convenience to many of the farms, will be diverted to the Cleveland market when the use of trucks by farmers becomes more

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general. At all events to-day Cleveland is getting better fruits and produce than she formerly did, and the farmers are getting better prices and more enjoyment in life. The cause will be seen in the produce markets, where fully half if not more of the vehicles are motored.

Ohio is not celebrated either for its grapes or wine, but however they may be labelled, much of both of these domestic products are raised and pressed not far from the Sixth City. The thrifty Italians and French engaged in this industry are fast learning that it is cheaper to haul their goods by truck than by railroad, where the distances are under 75 miles.

Grocers, butchers and other small tradesmen are rapidly being divided into two classes: the keepers of small neighborhood stores, which do a business in odds and ends, being called on to supply emergency wants, and the large stores and chains of stores whose modern high-speed and large-radius delivery equipment enable them to follow their motor car-owning customers into the high-class residence districts in the East Cleveland, Lakewood, Cleveland and Shaker Heights and East View districts, from 4½ to 7 miles from the Public Square. Furniture dealers also have been obliged to come to motor delivery through this back-to-the-soil emigration of most of the residents who can afford the freer life of the suburbs.

A couple of years ago Cleveland was saved from famine by motor trucks when a great blizzard cut it off from the rest of the world and imprisoned every traveller who had the misfortune to tarry there.

The citizens never tire of telling of the hardships. If she is ever snowbound again, Cleveland's trucks will see her through.

War and Trucks Boost Bridgeport

Motors Gain 60% in Past 2 Years

BRIDGEPORT, CONN., Nov. 17—Bridgeport, which has been called the mushroom city of the East, rivals those mining towns of the West which sprang up almost overnight. From a population of 102,000 at the last census of 1910, it now has a population of over 150,000, the greater portion of which has been secured since the beginning of the war.

War has been directly responsible for Bridgeport's rapid growth. The city is essentially a manufacturing one, in which the production of ammunition and firearms is pre-eminent. In fact, more ammunition and firearms are produced in the State of Connecticut than in any other State of the Union. Most of these products are manufactured in the city of Bridgeport and its immediately surrounding territory. Connecticut also leads the country in the volume of its brass and bronze products, which amounts to about 45 per cent of the national total. A large proportion of these products are made in Bridgeport and its outlying territory.

Helped Build New Plants

When the Allied nations found that they were using ammunition and firearms faster than they could turn them out themselves, they entered large orders in America, most of which were placed with Bridgeport's factories. Faced with larger orders than had ever been received before, her plants had to be run on 24-hour schedules, doubled or even tripled in capacity.

Factories of increased capacity mean more workers. Bridgeport's increase in population of 48,000 has been made up mostly of munitions workers and men employed in plants allied with the same industry. The sudden necessity of building larger plants and of housing approximately 48,000 new inhabitants forced Bridgeport to face a serious problem in which motor trucks have played a large part.

First, the building materials for the enlarged plants had to be rushed to the factory sites. Due to their great ground-covering ability as compared with horses, motor trucks found a ready sale for the work.

Serve Munitions Workers

Then new homes had to be built to accommodate the vast army of new workers and motor trucks played an important part in the haulage of the materials for these buildings. Many of these homes were built in the outskirts of the city.

Merchants were confronted with the problem of serving quickly the new city of workers with food, coal and ice and all the necessities of life. The new population was spread over an area much larger than served previously. Horses were too slow-moving to perform the work properly. Motor trucks were purchased.

As a result, motor trucks in Bridgeport have increased 60 per cent in the past 2 years. At the present time there are approximately 1000 trucks in the city, of which about 300 are over 1-ton capacity and the remaining 700 below 1-ton burden. Most of the latter class are used for the delivery of groceries, meat, vegetables, clothing and the necessities of life with the possible exception of coal and ice. The larger vehicles are used principally for general trucking purposes, the haulage of goods between the various manufacturing plants and in new State road construction work in Fairfield County, of which Bridgeport is the principal city.

Bridgeport is located at tide water and is one of the principal junctions on the main railroad line leading to Boston, Mass., and other New England points. Due to this fact, most of the factories in the city have railroad sidings which permit them to receive and ship goods direct by freight. For this reason motor trucks were not extensively used by the factories for bringing in or shipping out goods until the outbreak of the war.

Relief During Freight Embargo

Beginning during the latter part of 1914 and continuing for the year following, freight traffic along the Atlantic seaboard lines east of New York became so congested as to result in the freight car embargo. Then Bridgeport factories, speeded up to their maximum capacity, were held up by inability to deliver their products by rail. In the time of their need, they turned to the motor truck for help, and it has not proved wanting. Unable to place any reliability on the railroads for delivery, many of the manufacturing concerns decided to ship by boat to New York City, the chief point of export. Motor trucks served as an admirable means of getting their products to the steamer wharves and bringing back goods received by boat. Not content with the speed of boat shipments, many of the concerns delivered direct to New York by means of motor trucks. For instance, the Locomobile Co., maker of the Riker truck, delivered all its export trucks under their own power from its Bridgeport plant to New York, 60 miles, by way of the roads. This insured the trucks reaching New York without delay and also served as a good road test.

Many of the new factory additions erected as a result of the large war orders were built in various parts of the city at some distances from the original plants. This necessitated considerable interhaulage between the various units. This has been best performed by motor trucks, due to the larger loads handled each trip, as compared with horse wagons and the reduction of traffic congestion which would have been caused by the latter.

The only one of the large manufacturing plants in Bridgeport which has not got a direct railroad siding is the Warner Bros. Co., famed for its ladies' corsets, children's waists, hose supporters, etc. That concern has a siding about one-quarter mile from its plant, where it maintains a large warehouse

(*Continued on page* 27)

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A Chain Grocery Business Based on Motor Truck Distribution

Quaker Maid Stores in Louisville Undersell Local Groceries Because of More Economical Methods

By G. D. Crain, Jr.

THAT the motor truck can play an important part in the economical and efficient operation and development of the chain grocery store idea is being demonstrated by the Jones Co., Louisville, Ky., which in September, 1914, launched in Louisville ten grocery stores. These have proved so successful that since that time the company has increased the number to twenty-seven, being represented in all parts of the city.

This was accomplished in a city of 265,000 population where there were already 1100 retail groceries, or considerably more than were able to conduct the business in a manner profitable to all. Certainly Louisville, at the time the Jones company launched its chain of Quaker Maid stores, could hardly have been regarded as a promising field for a venture that projected not one, but many retail stores. No more so was Indianapolis, Ind., a city of the same size, where 6 months after it opened up for business in Louisville, the Jones company established ten of these stores, a number that has since increased to sixteen and which, thanks to the possibilities created by the motor truck among other important factors, seem destined as in Louisville to increase still more.

CHAIN-STORE marketing is a growth that has been marked in the last decade. Its future is difficult to forecast in all trades, but it unquestionably represents the logical development of the modern tendency toward organization and centralization. Chain grocery stores comprise one of the most representative fields of this sort of merchandising. Other fields are cigars, drugs and confections.

In this article a typical chain of grocery stores in a medium-sized city is studied. In future ones the other lines will be investigated. The outstanding feature of this work is that quick and economical transportation plays a large part in making the method practical.

Plan Based on Trucks

These stores were inaugurated upon the theory that only motor vehicles could do the work which would be essential to the success of the plan projected, and the officers of the company have not since seen fit to change their minds. The company is now using three motor trucks for its heavier work and two runabouts for emergency service in Louisville and, if the growth of the business in the first year and a half of operation is a criterion of the future, certainly is going to find need of augmenting this equipment.

The Quaker Maid stores are all supplied from a central warehouse, located on Market between Eighth and Ninth Streets, two blocks from the Ohio River front in Louisville. From this warehouse the heavier motor trucks make daily deliveries of stock to the various stores according to their needs. The two large trucks, a Packard 3-ton vehicle with a chain drive, and a Federal 3½-ton, each cover an average of 40 miles daily. Each of these trucks carries a special body 14 ft. in length behind the seat and a little more than 7 ft. wide. There are gates in the rear and the sides to facilitate loading and unloading both at warehouse and stores. A converted Ford 1-ton truck, a Ford runabout and an Overland runabout are used for emergency distribution, that is, for hurry-up replenishment of stock at any of the stores.

While the big trucks used in Louisville make about 40 miles daily, it is stated that a Pierce-Arrow 3-ton truck used in Indianapolis by the company has made as much as 60 miles a day. Officials of the Jones company attribute this disparity to the fact that Louisville still has some miles of cobble stone streets and the trucks are at times compelled to move much more slowly than they are in Indianapolis, where the streets are practically all of smooth asphalt or wood block.

It should be made clear that the motor equipment here mentioned is not used for delivery to customers. It is used wholly for distribution of stock from warehouse to retail stores or from freight cars, jobbing house or factory to warehouse. The Quaker Maid stores were founded originally with the purpose of reducing costs to consumers, in one way by eliminating delivery service. The projectors of the company started with the idea of being able to undersell the average retail store. They expected to be able to accomplish this in part by taking advantage of the growth of the passenger vehicle industry. They believed that a great many people who own motor cars would be willing to stop at the grocery and get their purchases, if prices were sufficiently inviting.

Cutting Out Delivery Extravagance

The way motorists were patronizing the country markets in the city gave them good reason to believe this. The non-delivery rule was later modified somewhat so as to provide for delivery of orders for $5 worth of goods or more, but an arrangement was made with a local motor delivery company to take charge of this part of the business. The large volume of business continues to be transacted with customers who call for their needs as originally planned, and pay on a strictly cash basis.

The motor trucks, as the plan was originally conceived, were to help reduce costs of operations, so as to make it possible to offer prices and stock that would make it worth while for patrons to come after their own goods. The company would, of course, be able to reduce costs by its ability to buy in job lots for a large number of stores instead of one. But it would also be able to reduce costs by means of its motor distribution. Here is where the motor truck came in.

In the first place, the motor truck has made possible a replenishment of stock at least once a day, or several times a

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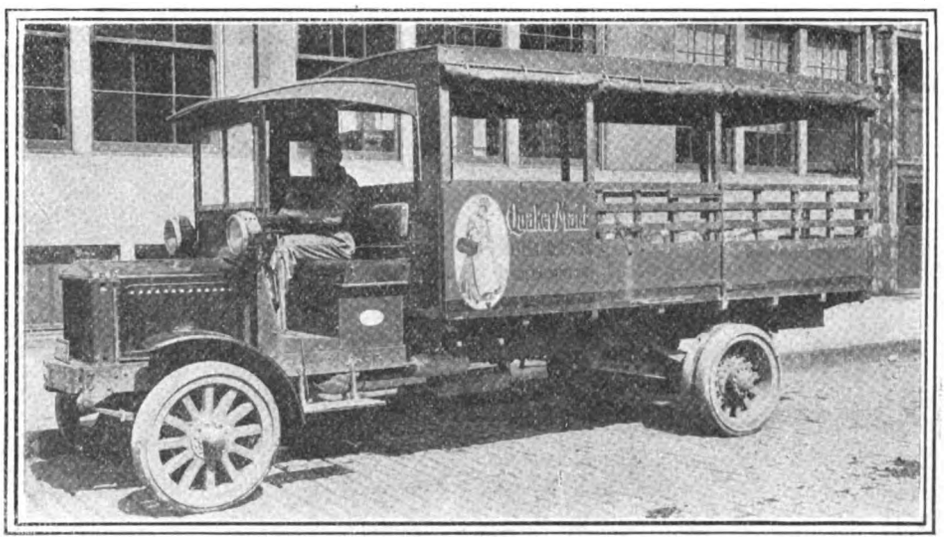
day, if necessary. This means that the Jones company does not have to tie up nearly so much capital stock in each of its stores as would the average retail grocer, who would find the drayage cost of such a system prohibitive.

This also makes for freshness of stock, for the wants of any one of the Quaker Maid stores can be supplied within an hour if emergency demands. The average retail grocer must of necessity carry a large proportion of his stock on the shelves for some time, and he cannot hope to have them replenished every day. This does not always make for good advertising in the appearance of the stock or in its palatableness after it has been tried by the patron. The Quaker Maid stores are able to furnish stocks that not only are palatable, but unusually fresh in appearance. No dust or fly specks are to be found on any of their package wrappers. The stores themselves are unusually bright in appearance.

The need, furthermore, of carrying only small stocks, means that the Quaker Maid stores occupy considerably less space than the average grocery. One of the first things that is observed about them is that all are rather smaller than the average store. But where one can replenish one's stock daily one needs much less room for storage and there is no necessity of occupying the costly amount of space that is an essential for the ordinary grocer. This means a considerable reduction in the cost of rental for the Quaker Maid chain and that is another item in the saving of capital.

Transportation-Effected Economies

Saving of capital makes possible a more intensive development of the field in which the chain grocery operates. It means that with a given capital it could operate many more stores than it would be possible for it to operate if much capital were tied up in larger rental and larger stocks in each store. This means that the Jones company can so distribute its stores as to make an appeal for the business of a large element that has no motor cars or other means of transportation to take advantage of the reduced prices and high grade goods offered by the chain grocery. There are many such who cannot afford to invest $5 in groceries so that they may be delivered, who have an aversion to attempting to carry their groceries on the street car, but who would be willing to walk a few blocks to a grocery to make their purchases.



3½-ton Federal used to distribute stocks to stores from the central warehouse

This is especially true of women. Women are the original bargain hunters. They are always looking for reduced prices. And it is they who buy most of the Quaker Maid groceries. There are many of them who are not able to induce their husbands to carry groceries home on the cars. They themselves do not like to do it.

The rapid delivery of stocks from the warehouse makes possible a great many stores for a given capital and there is perhaps no branch of the retail trade that will stand more intensive development than the retail grocery business. If it can undersell its competitors in each neighborhood as the chain grocery invariably can when in competition with the ordinary retailer, its possibilities are almost unlimited.

As has been pointed out, rapidity in distribution of stocks is one of the big essentials of the successful development of the chain grocery such as the Quaker Maid stores. Even if it were possible to accomplish this with horse delivery, which it is not, it is a serious question whether horse transportation would in itself be economical for carrying on the business, as motor delivery has proved to be. The motor equipment of the Quaker Maid stores represents in all an investment of about $7,000 to start. It is estimated that the operation of each of the big trucks costs only $10 a day. That includes driver, oil, gasoline, under normal conditions, and depreciation.

The trucks each carry on an average between 3 and 4 tons a day and sometimes a little less than 6 tons and cover from 40 to 45 miles daily. A good team would do well to carry 2 tons 20 miles daily, and a good team with wagon equipment such as the Quaker Maid stores would require would cost approximately $650. A salary of $50 a month could be figured for each driver and $25 a month for care of the horses and equipment and depreciation.



Packard 3-tonner which helps keep the limited stocks in the local stores constantly replenished

Teams Out of the Question

It would take from eight to ten teams to do the work that the two big trucks and the small one do, and then emergency deliveries could not conveniently or profitably be taken care of, so why figure on the use of anything other than motor equipment?

This the Jones company has used from the start in the development of its Quaker Maid stores, on the ground that motor distribution is essential to the profitable operation of the chain grocery store system.

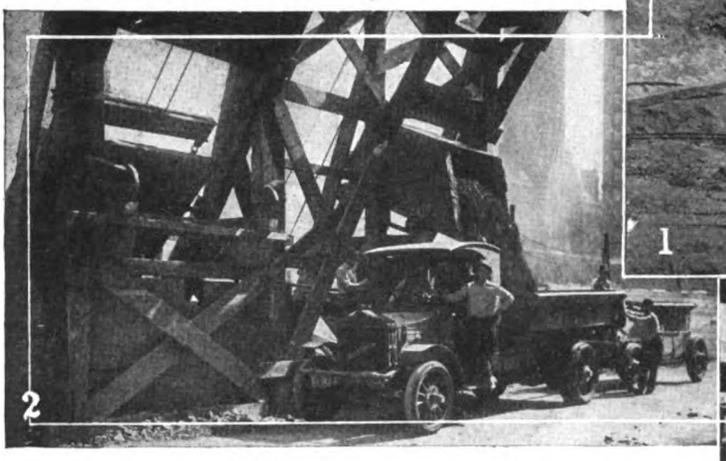
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Stuart Saves Seconds

Haulage Operations on William Penn Hotel Contract, Pittsburgh, Pa.

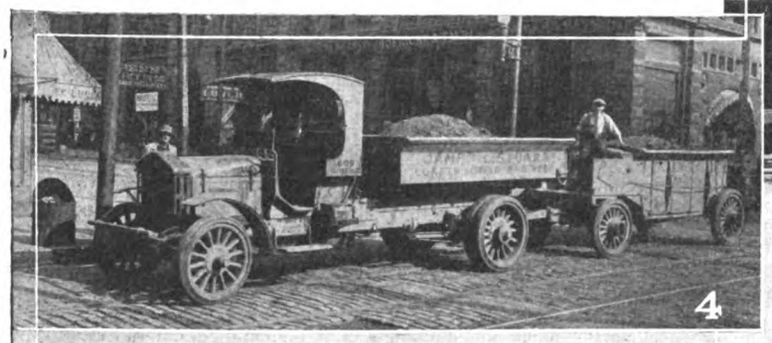
1—First the steam shovel fills the mine cars, ⅞ yd. at a scoop. A small locomotive raises these to the bunkers on the street level where—

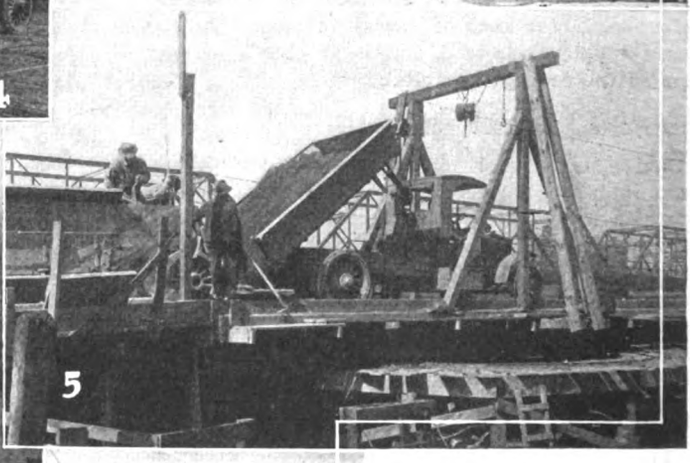


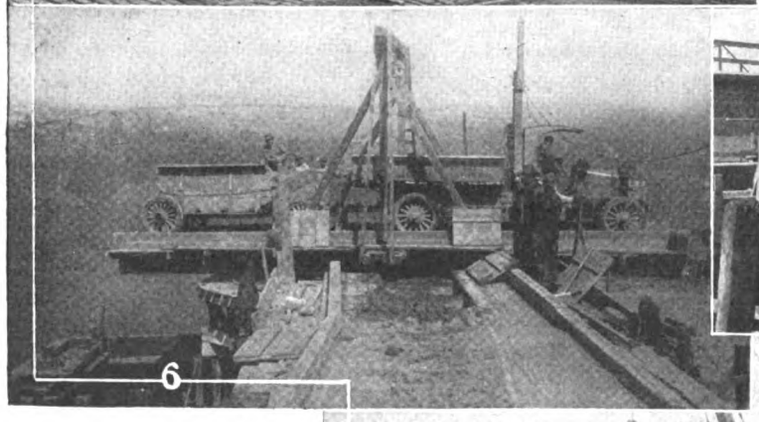


2—The material is loaded, 5 yds. at a time, into the trucks
3—And 3 yds. at a time into the trailers, simultanously—
4—The train then glides through traffic at 14 miles per hr.



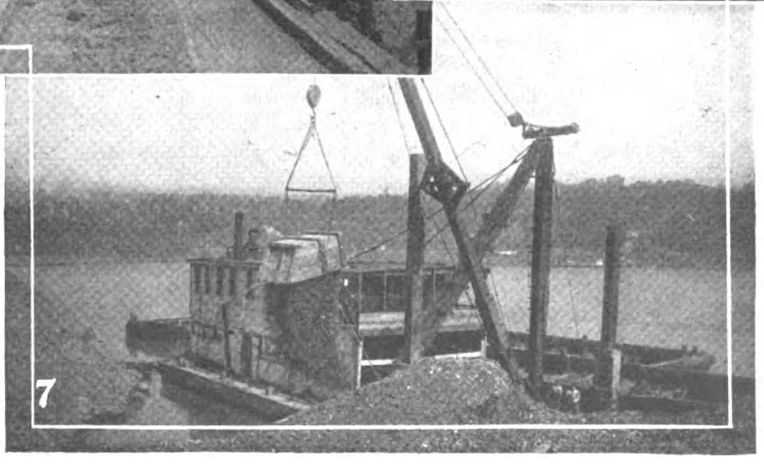






5—Arriving at the dump, the train runs onto the trestle and in the twinkling of an eye the 8 yds. are dumped into pockets over the barge in the water below—

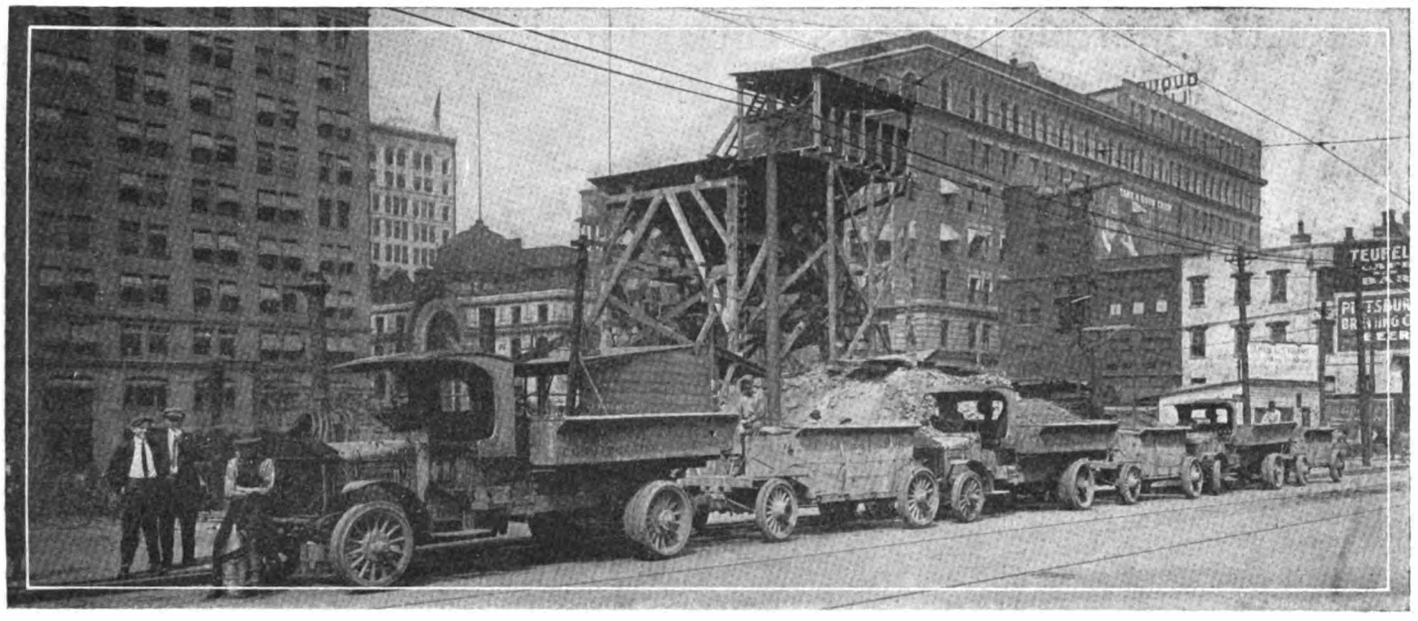
6—Then the turn-table swings around so that the train faces about and leaves for the return trip immediately.



7—Meanwhile the wooden pockets, beneath the trestle, are loaded on the barge in neat rows. When the barge is loaded it is towed to Davis Island, where the pockets are swung off by a derrick and the earth dumped, to form new land.

ILLUSTRATIONS FOR ARTICLE ON PAGE OPPOSITE

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Maximum street space occupied by Stuart's rolling stock, as represented by his three Pierce-Arrow 5-tonners with their 5-ton trailers, drawn up alongside the new hotel site

Highly Efficient Truck and Trailer Operation Rises to Emergency of Rush Work

Excavating Contractor Hauls 75,000 Yards of Earth in 60 Days for Pittsburgh's William Penn Hotel

RUSH work in excavating for the new William Penn hotel in Pittsburgh recently occasioned the employment of a truck fleet in an unusually efficient manner. Contracts were awarded principally on a basis of speed and James L. Stuart got the excavating contract because he agreed to finish the job in 75 days and actually did it in 60, while his nearest competitor required 90 days. Naturally trucks had to be used to make any such a record as this; but even with an excellent equipment of trucks, it was necessary for Stuart to employ numerous other time-saving devices.

Three Trucks—60 Teams

The work of the trucks was to haul the silt scooped from the earth by steam shovels, from the edge of the excavation to the river, where it was dumped onto barges. Three trucks with trailers did the work. With horses, to transport the same amount of material a day would have meant 120 horses and sixty wagons. It would have been impossible for this number of wagons to work on this job, however, owing to traffic congestion.

To haul the 75,000 cubic yards of material in 60 days required that the trucks work 20 hours a day, averaging eighty trips and 92 miles each.

At the cut, the steam-shovel loaded the dirt into mine cars, which, made up into trains, were hauled to the surface by a small industrial steam locomotive. Here the cars were dumped into wooden hoppers raised above the street level, from which it was chuted into the vehicles. The haul was 1.2 miles in length, mostly down-grade to the river. At the river was a trestle. The trucks were equipped with hydraulic dumping gears, which made the dumping a matter of minutes. The trailers were of the bottom-dumping type, so that their entire loads were ejected in about the same time. At the loading hoppers the trucks were loaded in 30 seconds and at the unloading trestle less than 8 seconds were required to unload.

So as to economize time at the unloading point still further, the dumping section of the trestle was made in the form of a turn-table, so that the trucks with their trailers ran onto it head-on, dumped their loads, and then, when the turn-table was swung half-way around, were able to run off without backing or turning. The loads as they sifted through the trestle were caught in wooden boxes which were swung by a crane over the barges and piled. The entire unloading time was less than 1 minute from arrival at the trestle to departure.

The return run was up-hill, but was always made empty, so that the hills did not decrease the speed materially.

The equipment comprised three Pierce-Arrow 5-ton trucks and three specially-built bottom-dump 5-ton trailers, mounted on rubber tires and having their own brakes. The trailers held 3 cubic yards each and the trucks, 5.

Trailers in Day Only

The trailers were only used during the day shift. This was because they slowed down the trucks. In the daytime the street congestion was such that the trucks could only average 5 miles an hour, including stops. Such a speed by the trucks alone would have meant less than their full capabilities, so the trailers were attached to make up for the loss in time by increasing the yardage hauled per trip. At night, when the streets were clear the trucks operated alone, averaging 13 miles per hour, including stops, thus equalling the combined yardage of trucks and trailers under day conditions.

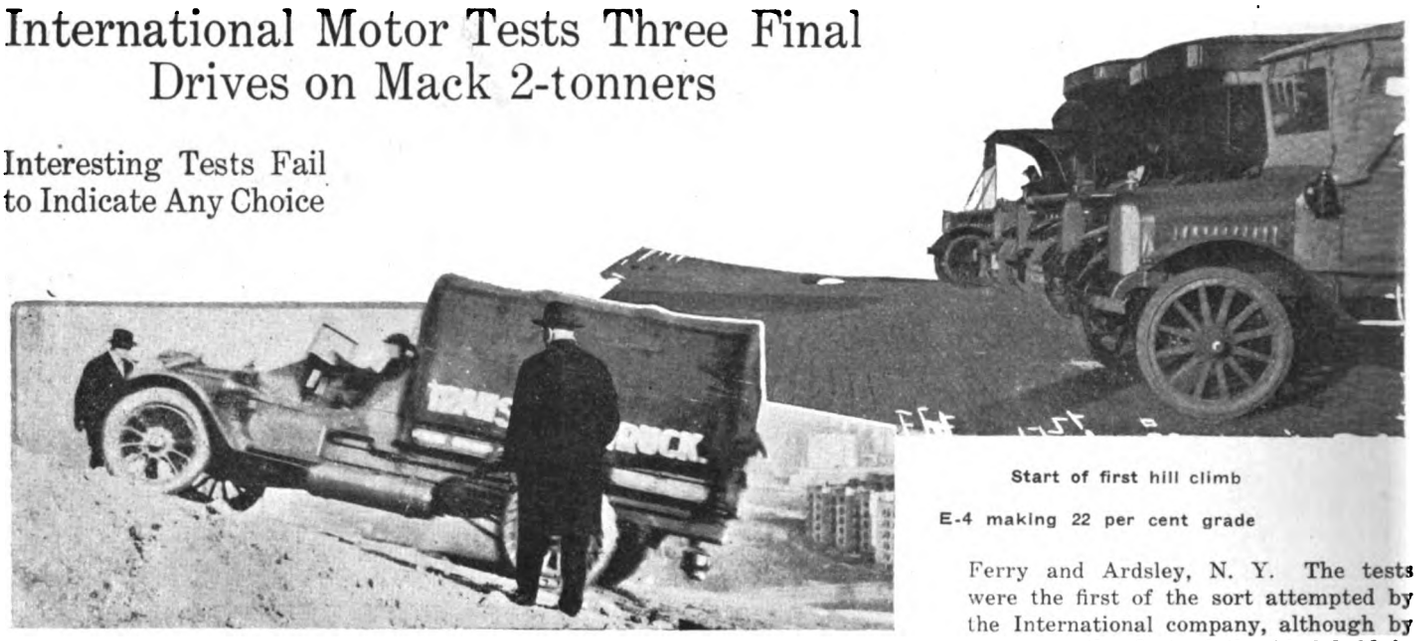
The average round trip consumed 15 minutes, although 7 was the record.

Much of the success of the venture is attributable to the attendance of a night inspector, who, during the 4 hours' rest between the night and morning shifts, carefully went over each of the vehicles and saw that everything was in good repair and adjustment. There were no delays due to mechanical trouble.

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International Motor Tests Three Final Drives on Mack 2-tonners

Interesting Tests Fail to Indicate Any Choice

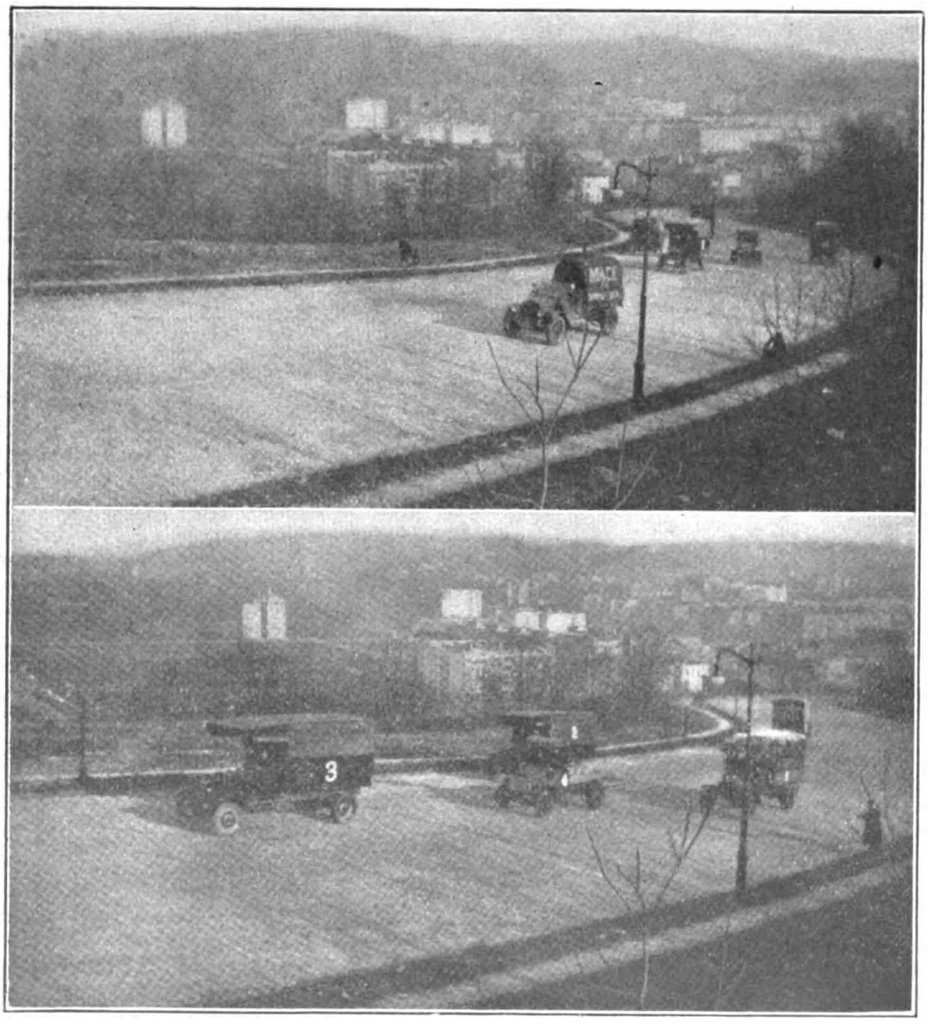


Start of first hill climb

E-4 making 22 per cent grade

PHYSICAL tests, believes the International Motor Co., can do more to determine the merits of a thing than all the theory and discussion in the world, and in the matter of final drive, while committed to two types, the company manufacturing Mack and Saurer trucks is broad-minded and willing to put its beliefs into practice.

Accordingly a preliminary test of three forms of final drive was conducted on Sunday, November 19, on Fort George Hill, New York City, and upper Broadway through Yonkers, Hastings, Dobbs Ferry and Ardsley, N. Y. The tests were the first of the sort attempted by the International company, although by no means the first of the kind held in this country, and while interesting and instructive to the engineers who made them, they were by no means conclusive.



Scenes on Fort George hill climb, with the E-4 carrying the timers

That the tests proved nothing in particular and little of technical value in general detracts nothing from the importance of the event, since of a long series of tests of the sort this is the first which has been made openly and publicly by any American manufacturer. Most of the larger builders of trucks have had experimental trucks in use, employing various types of drive, but anything in the manner of a competitive test has always been conducted secretly and the results either not divulged at all or in such general terms as to mean little.

Other Tests Probable

That the International company in this instance declines to indorse the results merely means that it does not wish to be responsible for any conclusions not well justified. It intends, it is understood, to repeat the test under more favorable conditions, profiting by the experience gained in this preliminary one. The tests were witnessed by two representatives of THE COMMERCIAL VEHICLE, who while perfectly at liberty to do so, believe that the actual showing of the different chassis was inconclusive and so should not be published.

The tests comprised three contests, the first being the repeated ascent of Fort George hill, on the northern end of Manhattan Island, a steep, winding incline, paved with cobbles, averaging about 10 per cent grade and 710 feet long. The second was conducted on a knoll of sand on a filled-in section at one side of the top of the Fort George hill, not far from C. K. G. Billings' estate. The third was an economy test of 52 miles up the east bank of the Hudson River.

The trucks tested were six in number, only four being properly considered

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Scenes on the 22-per cent sand knoll—Upper left, chain-driven No. 4 about to start up the hill; note rear wheels in ditch. Upper right, marking off the distance it climbed. Lower left, on the way up. Lower right, E-4 makes it

as test trucks. These were numbered from 1 to 5, the sixth, numbered E-4, being a special 1-tonner built and used for experimental work by the engineering department of the company. All the others were regular 2-ton Mack chassis identical except as to body and final drive. Each was loaded to the same total weight, and each was driven by professional truck drivers, only one of whom might be considered appreciably above the average in skill.

No. 1 was equipped with a Torbensen internal-gear-driven axle with an 8 to 1 gear-ratio. No. 2 was the standard Mack with a Timken worm-driven rear axle with a 7¾ to 1 reduction. No. 3 has a Celfor internal-gear-driven rear axle with an 8 to 1 ratio, and Nos. 4 and 5 were standard chain-driven chassis, geared 7.86 to 1.

The Trucks Tested

No. 1 was a new chassis and the axle had not been sufficiently worked in. Its brakes also dragged a little. No. 2 was the demonstrator for the New York service station and had seen moderate service. No. 3 was an experimental job, with Besco steel wheels, which had been sold to James H. McManus, a truckman. It was taken from its regular service for the test. No. 4 had just been received from the Plainfield factory. It was unpainted and had no body. It also had a shorter wheelbase than the others and was loaded with test weights instead of the regular body with which the others were provided. No. 5 was taken direct from the service of Sohmer & Co. and carried two pianos as a load. It developed engine missing and so its performance was not considered.

Five ascents of the Fort George hill were made, the first two times with one stop at the middle of the hill, the third time with four stops and the last two with six stops. So as to eliminate the human factor, the drivers were changed three times, each driver operating three different trucks in the five tests.

The motors were all tested before the start and their governors set to close at the same speed. The best time made by the winner of any of the climbs was 4¼ miles per hour, and the slowest of any except No. 5 was 3.85 miles per hour.

After the hill-climb a spot was selected where a sharp rise over a knoll of sand rose from a flat spot with a ditch at the bottom. To the top of this knoll was a distance of about 75 feet on more than a right-angle turn and the grade, as determined by roughly sighting from the side, was about 22 per cent.

None of the four trucks which were under test succeeded in making the climb, but each climbed part way before stalling. The trucks were all started with their front wheels part way up the grade and their rear wheels in the ditch, or the worst possible position. The climb was made by the E-4, by a large and powerful Benz touring car and a Ford runabout, the latter making it with apparently no effort a full second under the time of the Benz and 1½ seconds faster than the E-4.

The temperature at the time of starting the first test was 36 degrees and the humidity 96 per cent.

The afternoon test was started at 2 p.m. at a temperature of 51 degrees and 90 per cent humidity. Some of the trucks lost their way at Yonkers and so made greater mileages than others. Only three of the trucks succeeded in completing this test in a proper manner, No. 5 being still in bad order and No. 4 having leaked out all of its oil through the carelessness of one of the mechanics in not closing one of the cocks. One of its bearings seized on the return from the morning tests and so it was not sent on the afternoon test. The three finishing trucks did 7.96, 8.2 and 8.25 miles per gallon of fuel, making average speeds of 12.6, 12.9 and 13.1 miles per hour.

One of the greatest lessons which these tests taught was that most of the efficiency with which a truck operates depends upon the driver, whether in the hands of a user or of the designing engineer. Realizing the great effect of this factor, the tests on the sand knoll were made with one driver, a factory demonstrator. On the Fort George hill climb it was found very difficult to standardize the test stops, since some of the drivers would come to a full stop with brakes set, while others contented themselves with merely releasing their clutches or taking their feet off their accelerators.

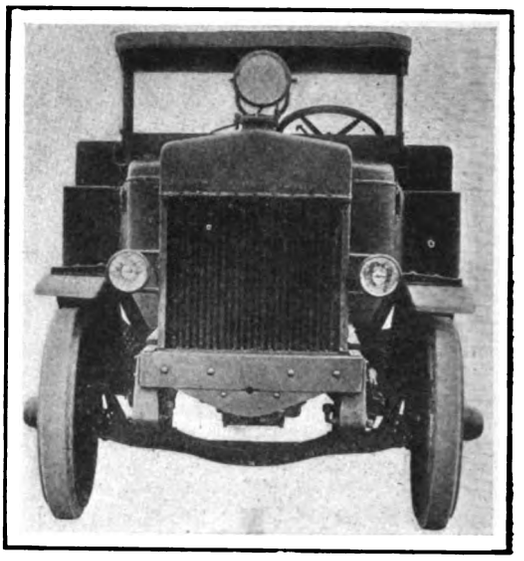
Climbs vs. Claims

There was scarcely a man who attended the tests but had to revise some of his preconceived ideas about the merits and demerits of the different drive forms, and there is no question that if manufacturers would substitute more of this sort of testing for the heated claims and counter-claims which are circulated, to the vast bewilderment of the truck buyer, none of our standard axle types would suffer by comparison and all might gain considerably in the estimation of the buyer.

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Four-ton Canadian War Service Truck

SIMPLICITY, FLEXIBILITY AND RUGGEDNESS, FEATURES OF CHASSIS



Head-on view of Brantford British Motor Transport chassis, showing imposing radiator, simple, but substantial lamp mounting and great width of cab and body

DICTATED by the requirements of the British Mechanical Transport, but typically American, notwithstanding, the design of the 4-ton chassis which for some 18 months past has been built by Motor Trucks, Ltd., Brantford, Ont., is one of the most interestingly original ones which the acceleration of truck engineering occasioned by the war has brought forth. Howard Wilcox, who is responsible for a number of notable successes in this country, is the designer, and while this chassis is in most particulars totally different from anything he has in the past attempted, it nevertheless shows a long development of ideas gained in years of intensely practical experience.

There are two kinds of simplicity: that which has to do with ease of manufacturing and assembly, much to be desired from the standpoint of economical production, and the kind which relates more directly to the operation of the truck, the sort which means reliability, mechanical efficiency, ease of care and of operation. Both of these kinds of simplicity have been combined in Mr. Wilcox' chassis, and by the same means has each been accomplished.

Fundamentally the chassis is simple. It is also silent and embodies a high degree of flexibility. In the frame—the very backbone of the truck—there is primarily simplicity, since there are no rigid cross-members save at the extreme rear end, where there is one large one to carry large gussets to maintain the rectangularity of the frame. It is cold pressed of ¼-in. stock, 7 in. deep, with 4-in. flanges.

This simplicity makes for ease and economy of assembly, it makes for accessibility to the parts and it makes repairs less difficult. By this simplicity the third characteristic of the design,—flexibility—is secured, for with all of the cross-members, and only a few at that, of the tubular type, the frame becomes a true De Dion form, which, continuing the chain of cause and effect, permits the use of very flat springs.

These flat springs are accountable in a large measure, according to Mr. Wilcox, for the success of the Hotchkiss drive. Hotchkiss drive in itself is a flexible construction. It is also vastly simpler than other forms of connection.

The Transmission Unit

Perhaps in the transmission unit Mr. Wilcox has secured the greatest simplification in the whole vehicle, for here the clutch, primary shaft, gearbox, brake rocker-shafts and the pedal and lever assembly are incorporated in one demountable group, which, incidentally, so splits the shaft that the secondary or final section is only 26 inches long. Simplicity, flexibility and silence are attained by the use of fabric-disk universals.

The truck departs from traditions in its appearance, as in everything else, an imposing effect being produced by the extreme height of the smooth-surfaced cast-iron radiator, while a satisfying feeling of stability is lent by the wide, squat lines of the cab.

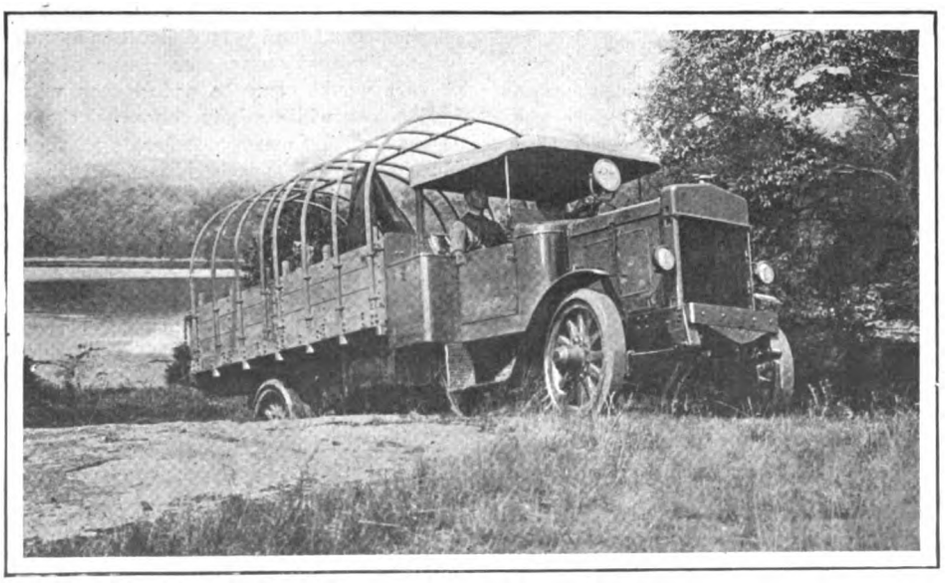
The driver has been given every consideration, as a prominent contributing factor to the efficiency of the truck in operation. His cab is broad and low with a deep, high cowl dash and big, substantial hinged doors on both sides. It has deep cushions and a heavily-padded back, favorably comparable with the upholstery on a fine touring car. The steering column has a considerable rake and a 22-inch hand wheel.

Controls are simple, since there is but one pedal, so that the driver need not continually shift his foot from accelerator to brake pedal and back. There is no spark lever and the truck is electrically started and lighted. The cab has a top on permanent posts that extends well over the dash.

The greatest contribution to silence, as well as the most distinctive feature of the truck, is its motor, for this is a Knight of the same type as adopted by the Fifth Avenue Coach Co. for its new buses, and built by the Moline Motor Car Co., Moline, Ill. It has four cylinders, 4 by 6, rating 25.6 by the N.A.C.C. formula, but having shown 65 horsepower at 1,800 r.p.m.

The Sleeve-Valve Motor

Cylinders are cast in block, together with the inlet manifold, which is completely water-jacketed. The sleeves are so placed in the cylinder that their upper ends are incased by water-jackets on both



Wilcox military truck romping up a bluff near Brantford, Ont.

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sides, and they are operated by eccentrics in the usual manner.

Pressure lubrication is secured from a gear-pump, forcing the oil through the drilled crankshaft to main and connecting-rod bearings at pressures up to 50 lb. per sq. in., which vary with the speed, thus providing automatic gradation of the oiling. There is no splash, but the spray from the cranks serves to lubricate the eccentric shaft and the wrist-pins. The wrist-pins are hollow and serve to convey the oil to the sleeves, which are oil-grooved and drilled and which in turn work the oil thoroughly between themselves and the cylinders.

Thermo-syphon water circulation is used and by dint of exceedingly liberal water spaces in the cylinder block as well as unusual radiator capacity, a somewhat sluggish circulation is made to have a cooling effect equal to a more rapid forced system through smaller passages. The radiator has unusual height, so that an excellent head of water is secured. Besides this, the top tank extends some distance above the top water header, so that an increased head is provided. The lower headers are two in number, one conducting the cool water to the front of and the other to the back of the cylinder block.

The radiator casing is entirely cast, comprising four pieces, the large top tank, a smaller bottom tank and two side plates. The cooling system has the unusual capacity of 17½ gal., most of which is in the radiator. This should provide a supply to last a long time, as it is far in excess of the usual volume. The core of the radiator is of helically-finned copper tubes, individually demountable and sealed by cork gaskets without solder. The top and bottom plates are of copper or brass plate.

A high-tension single magneto with fixed spark cares for ignition automatically. The auxilliary electrical system consists of a Wagner starting and lighting outfit, with the generator and motor separate. The generator is driven from the same shaft which drives the magneto, this shaft being driven within the timing gearcase by the same silent chain which drives the eccentric shaft gear from the camshaft. It also drives the V-belt for the 20-inch three-bladed cast aluminum propeller type fan.

Electric Starting

The starting motor, which drives the flywheel through teeth milled on it, was selected by testing for a motor powerful enough to start the Knight engine after being in cold storage at a temperature below zero for 24 hours.

The carbureter is a Zenith, which harmonizes very well with the rest of the chassis, since it has no adjustments, valves or springs. Incorporated with the carbureter is the Monarch gas-velocity governor, which operates without outside mechanical connections of any kind. The adjustment of this governor is easily made and is locked with a padlock, so that the driver cannot change it. In its setting, established precedent has been set aside, since it permits the motor a speed of 1,800 r.p.m. It is said that the truck may safely be driven for a distance not to exceed 10 miles at 30 miles per hour, and for an indefinite time at 25 miles per hour. It will be remembered that the British Mechanical Transport tests include just such runs as this.

The carbureter is fed by pressure from two tanks, mounted in an original manner. These tanks are 12 by 14 inches, of bolster shape, each made of two seamless drawn steel shells, telescoped and welded. Each holds 20 gal., and they are suspended by steel straps from two yoke like wood beams laid across the frame, so that the tanks lie just outside the frame side-members back of the cab. The pressure is automatically maintained by an air-cooled two-stroke air pump driven by the engine.

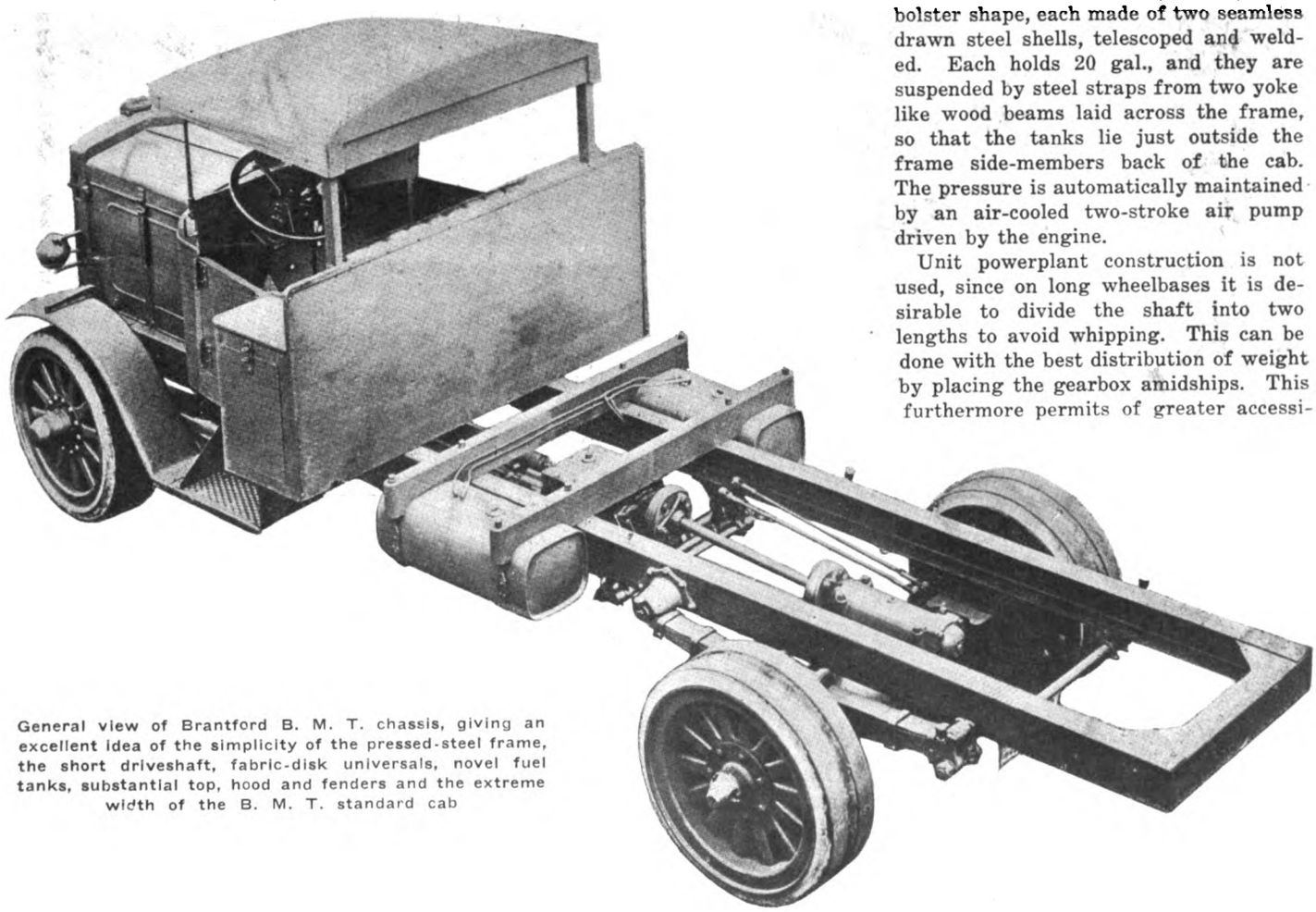
Unit powerplant construction is not used, since on long wheelbases it is desirable to divide the shaft into two lengths to avoid whipping. This can be done with the best distribution of weight by placing the gearbox amidships. This furthermore permits of greater accessi-

SPECIFICATIONS

Capacity, lbs.	8,000
Wheelbase, in.	159
Tires, front	36x5
rear	36x5d
Bore	4
Stroke	6
N.A.C.C. hp.	25.6
Speed, r.p.m.	1,800
m.p.h.	22½
Gear-ratio in high gear	8 ⅝-1
Final drive	worm

MISCELLANEOUS MEASUREMENTS

Gearset ratios:		
First	4.84 to 1	
Second	2.84 to 1	
Third	1.50 to 1	
Fourth	direct	
Reverse	5.81 to 1	
Total gear-reductions:		
First	42.35 to 1	
Second	24.85 to 1	
Third	13.12 to 1	
Fourth	8.75 to 1	
Reverse	50.84 to 1	
Truck speeds in m.p.h.:	r.p.m. 1,800	r.p.m. 1,000
First	4.57	2.54
Second	7.76	4.31
Third	14.68	8.16
Fourth	22.05	12.25
Reverse	3.78	2.10
Loading space back of driver's seat	12 ft. 3 in.	
Track, front	60½ in.	
rear	67 in.	
Chassis overall length	20 ft. 3 in.	
Height to top of frame	32 in.	
Overall width	7 ft.	



General view of Brantford B. M. T. chassis, giving an excellent idea of the simplicity of the pressed-steel frame, the short driveshaft, fabric-disk universals, novel fuel tanks, substantial top, hood and fenders and the extreme width of the B. M. T. standard cab

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bility and also allows the unit transmission embodied in this design, to be employed. The motor is therefore independently mounted on three points, direct from the main frame.

Between it and the transmission unit is a fabric disk universal.

The transmission unit, which, because of patent applications cannot be illustrated, comprises the clutch, gearbox, control unit, intermediate driveshaft and brake rocker-shafts assembled into a rigid unit, independent of the rest of the power and driving system. It is suspended on three spherical joints, one at the front, on a tubular cross-member and two at the rear, on the side members. At the front is the clutch housing.

The clutch is a Brown-Lipe dry-disk type, designed to run without oil and of such proportions as to be uninjurable through slipping. It connects with the Brown Lipe gearbox by a long tube, inclosing the driveshaft.

The gearbox is square with a light removable cover on top. It affords four speeds and one reverse. The gears and shafts are nickel steel, heat-treated and the gears are of 5-7 pitch with 1¼-, 1½- and 1⅝-inch faces. An interlocking arrangement is provided to prevent engagement of more than one pair at a time.

Back of the gearbox is a tubular cross-member, rigidly attached to the back of the gearbox, and paralleling it are two brake rocker-shafts. Just back of the clutch at the front end is the selector or control unit for the gearset. The shifter-rods connect it with the gearset, and due to the rigid assembly of the whole transmission unit, correct alignment is assured.

To a bracket at the side of the clutch the hand brake lever and the pedal are attached, their pull-rods to the brake rocker-shafts extending back in straight lines. The pedal is mounted on the clutch throw-out shaft direct and carries a brake pull-rod besides, so that it fulfills the double duty of clutch release and foot brake.

Short Driveshaft

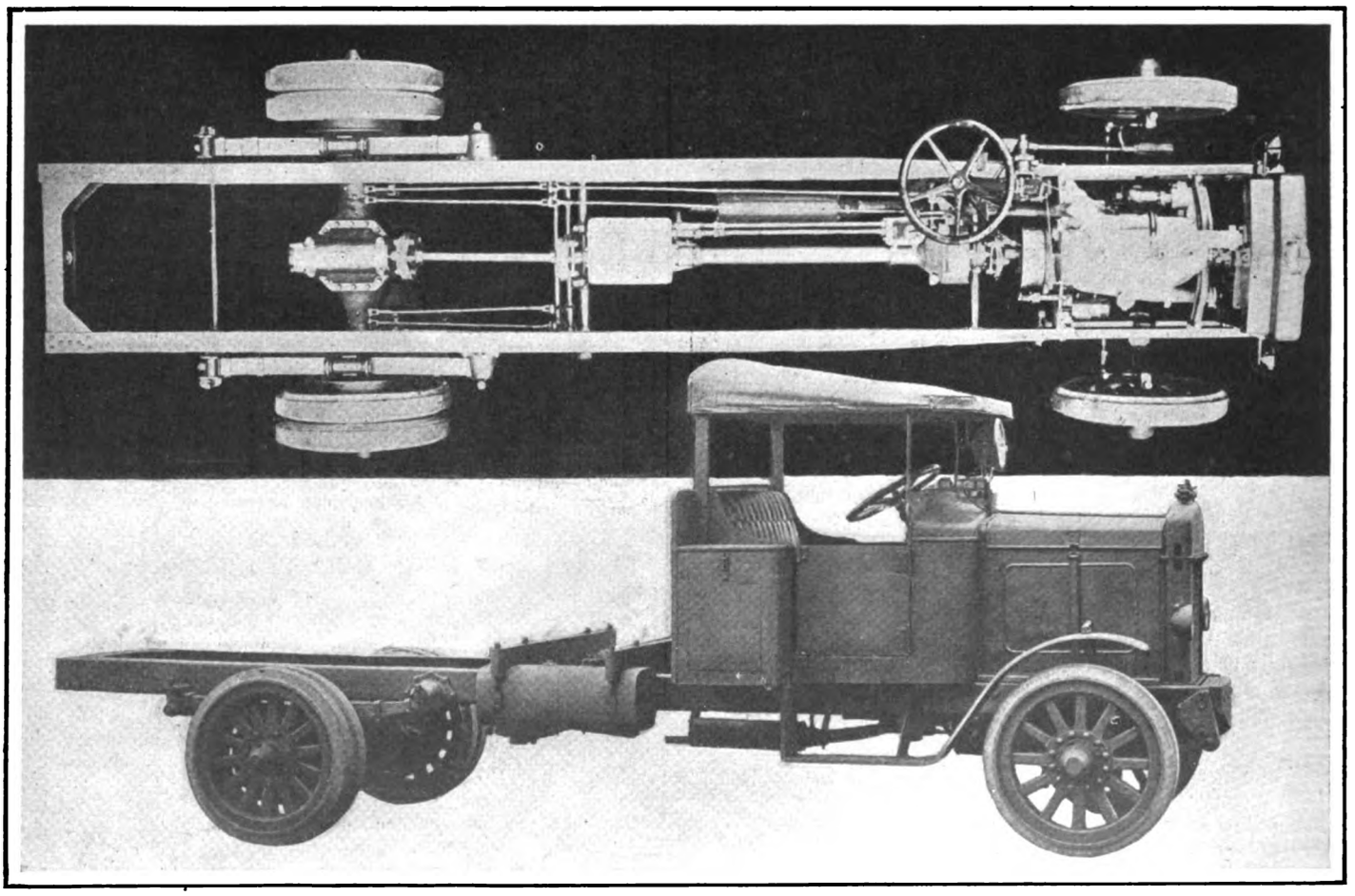
Back of the gearbox the final or secondary drive is taken by a 26-inch solid shaft with two fabric-disk universals, to the worm-driven rear axle. This is essentially a Sheldon type, except that it has some special features of its own. One of these is the M. & S. worm self-locking differential. A number of trucks have also been built by this concern without any differentials. These axles have cast steel housings, side-by-side internal brakes and are of semi-floating construction.

The springs through which the torsion and propulsion are transmitted are of the banded type, steel bands being shrunk on at their middles in lieu of a center bolt, thus avoiding any weakening hole at this point. They are flat, under load and have three reversed leaves on top, to resist rebound. These rebound springs are equal to about one-fourth the thickness of the main springs. The front springs are 44 inches long and 3 inches wide, and their eyes are bushed for ¾-inch diameter bolts. Rear springs are 56 inches long and 3½ inches wide, bushed for 1¼-inch bolts at their fronts and for 1-inch ones at the rear, or shackled ends. Three rebound clips are used on each spring.

The axle clips are of the round type, bent in an arch over the springs without sharp bends, an iron filler block being inserted between them and the tops of the springs. The shrunk-on bands are machined to accurate size to fit grooves in the spring perches, so that they transmit the propulsion instead of the clips.

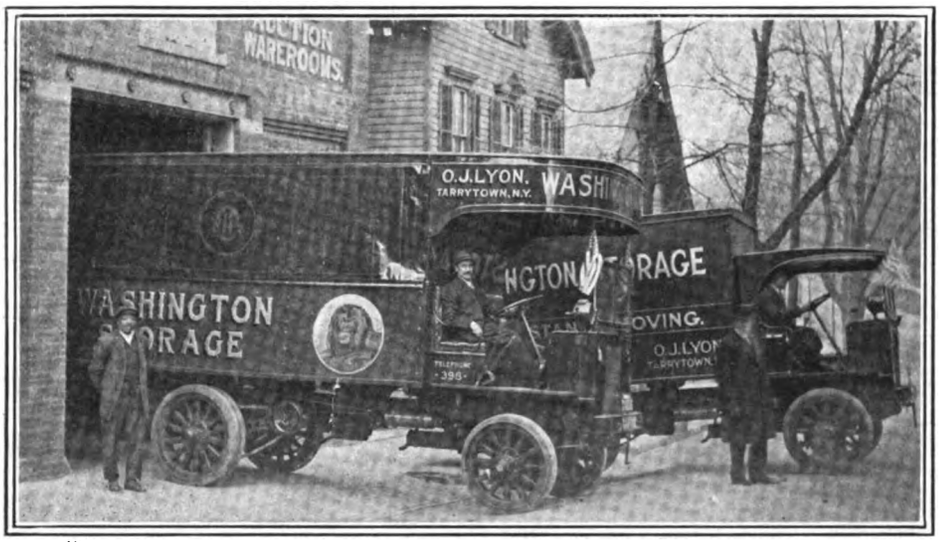
Wheels are of wood, with square spokes, fourteen on the rear and twelve in front. The same sizes of tires are used front and rear, namely, 36 by 5, single in front and dual behind.

The steering gear, oddly enough, since the vehicle was designed for European use primarily, is on the left side. It is attached to the main frame side-member and has a column angle of 35 deg.



Top and side views of the 4-ton Brantford-made vehicle, showing absence of rigid frame cross-members, separate mounting of the Moline-Knight engine, transmission unit and proportions of cab and hood

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One of these 4-ton Garfords delivered a load of furniture from Tarrytown, N. Y., to Lake George, N. Y.

Great pains have been taken in the finish of this job. The hood is made of 16-gauge steel in three sections. The top section is hinged to the dash and the side sections to the frame sills and detachable. The hold-downs are two in number, being forged and connected with the frame sills by leather straps provided with light springs to keep the hood tight and prevent rattling and at the same time allow for the movement of the radiator on its flexible mounting in response to frame weaving.

Fenders and steps are of 14-gauge steel, pressed from one piece and held in place by heavy cast braces riveted to the tops of the fenders. A simple bracket of bent sheet steel supports the running-board. The headlights are attached to forks extending horizontally on each side of the radiator. In the front is a metal-covered wood bumper to protect the radiator.

The cab is constructed entirely of steel and has a seat wide enough for three large men. On each side of the seat is a large tool box and across the back is a wide bulkhead.

War and Trucks Boost Bridgeport

(*Continued from page* 17)

for carload shipments to distant points. Most of its goods going to the nearby New England points and New York City is shipped by boat, trucks being used to transfer it from the plant or warehouse to the docks. Likewise all of the company's goods is hauled to the plant by trucks, whether the goods reaches Bridgeport by rail or boat.

As a result of the big demand for labor in the munitions plants, Warner Bros. experienced considerable difficulty in obtaining sufficient help to operate its own factory at maximum capacity. New factory sites were scarce and expensive.

Motor trucks helped the company to find a way out of its difficulty by establishing separate plants in Stamford, 23 miles away; in Danbury, 29 miles away, and in New Milford, 40 miles distant. All of these plants are served direct from the main factory in Bridgeport by the company's fleet of motor trucks. In these cities labor was not as much in demand as in Bridgeport and plenty of girl help could be secured.

The roads outside of the city limits are fairly good. This has made possible increasing and more extensive use of trucks in the outlying sections. Motor trucks have also played an important rôle in building the roads themselves. The Connecticut State Highway Commission is operating a large fleet of heavy vehicles in transporting the road building ingredients from the nearest railroad sidings or from the quarries themselves.

In the city proper the pavements are in fairly good condition, although many of the streets are narrow, especially in the downtown section. Within the city limits there is a land area of 14.64 square miles; 0.37 miles of fresh-water area and 2.9 square miles of salt-water area, a total of 17.91 square miles.

Sheet asphalt, which is not particularly adapted to motor truck traffic, is not used on any of the Bridgeport streets. In all there are 100 miles of improved and semi-improved streets in the city in addition to approximately 81 miles of gravel and dirt roads. The improved or semi-improved streets are divided into 14 miles of permanent pavement with a concrete base and either wood, granite block or brick surfacing; 81 miles of water-bound macadam laid for more than one year, and five miles laid during 1916.

Truck Bests Rail on Long Haul

MAY BE RECORD FURNITURE MOVE BY MOTOR VEHICLE

SAID to be the longest motor-truck furniture-moving job ever undertaken in Westchester County, a 4-ton Garford truck owned by Olin J. Lyon, Tarrytown, N. Y., recently carried a capacity load of furniture from that town to Bolton Landing, Lake George, N. Y., a round-trip distance of 448 miles.

The total running time of the entire trip was 48 hr., or an average of 9⅓ miles per hour, which is extremely creditable considering the steep grades of the mountain roads leading into Bolton Landing. At some places these were so soft that the rear wheels of the truck often sank down clear to the hubs, necessitating the use of planks under them to extricate the vehicle. During much of the trip it rained, thus making the going on the side roads very slippery and treacherous.

Saved Time and Handling

Notwithstanding these difficulties, both the truck and its load completed the first half of the journey without mishap, and in less time than it would have taken to ship the goods by freight, with the necessary haul to the railroad yard at one end and the haul from another yard at the other end.

The gasoline consumed during the 448-mile run was 88 gal., and the lubricating oil 4 gal. The average mileage per gallon of gasoline was slightly more than 5, and the lubricating oil 112 miles per gallon.

Above the Clouds

HIGH up in the stupendous heights of the Andes Mountains, in South America, two American trucks —Jeffery Quads, four-wheel-driven, braked and steered—have, it is said, broken the altitude records for motor truck operation.

Such a height—15,000 ft., or over 2½ miles above the level of the Pacific Ocean—means rarified atmosphere and bitter cold. The trucks are used in Chile for the transportation of the valuable nitrates which abound in that vicinity.

They were sold by the Jeffery dealer in Iquique, Chile, A. F. Syers-Jones. Recently in one 8-hr. day the pair transported 30 tons of the valuable ore a distance of 75 mountain miles, encountering grades of as much as 20 per cent and most of the time in a temperature which sank far below zero Fahrenheit.

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Motor Four-in-hands in Wars of Two Continents

Glimpses of Military Service on the Marne and the Rio Grande, by U. S.-built Trucks



Above is a Jeffery 2-ton Quad tossed as on a stormy sea by the rolling hillocks of sage-strewn and mesquite-dotted Mexican alkali. It is in country such as this that the four-wheel-driven truck finds its forte. To the right is a twin brother of the truck, faithfully plugging for the Allies 6,000 miles away





Jeffery Quad hauling ammunition for French artillery near the scene of late operations about the shattered city of Verdun



Some of the work that is being done by our four-wheel-driven trucks with Gen. Pershing's punitive expedition in Mexico. Above are some F. W. D. trucks caught in a sand-storm, followed by a heavy rain, about to run through a mud-filled lake, bottom—one of those southwestern dry lakes that sometimes fill up

The other truck is a Jeffery four-wheel-driven truck on what is alleged to be a street, near the border. Whether it got out is unknown, but it is likely that if not neither did the mules

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Crescent Electric Industrial Trucks In One Standard Model

New Vehicle of Warehouse Platform Type

ONE model of the four-wheel steer, two-wheel drive type of electric industrial truck is produced by the Samuel L. Moore & Sons Corp., Elizabeth, N. J. This truck is of the warehouse platform type of 2 tons capacity and follows accepted standards in principal features of construction.

The Moore corporation has just recently placed its vehicle on the market, although the firm has been in the business of shipbuilding, founding, engine-building and machine manufacture since 1854.

Simplicity and compactness have been achieved by grouping the motor and reduction gear on the driving axle and placing the battery amidships, under the frame. The entire platform is clear and unobstructed, having a vertical dash frame at one end and removable stakes at the other. The four-wheel steer enables the truck to turn within a 15-foot circle.

There are no springs in its construction, the 4-in. channel-steel frame being bolted directly to the axles. The non-driving axle is of the motor truck type, of I-section forged steel. The driving one is of the floating type with universal joints transmitting the drive through the steering knuckles. The motor occupies a position above the axle and drives an idler shaft through spur gears. This shaft carries the brake drum and the worm which drives the axle. An M. & S. worm-gear differential is used to provide positive drive at all times.

The battery is the Ironclad Exide, as standard, but an Edison may be supplied, if desired. The Ironclad Exide is of 21 cells, giving 156 amp.-hours. The Edison has 36 cells, giving 150 amp.-hours.

The motor operates at 36 volts, 35 amperes, at 1000 r.p.m., and is built to withstand a 200 per cent overload for 10 minutes without overheating. The controller is mounted under the driver's platform and is of the continuous-torque drum type.

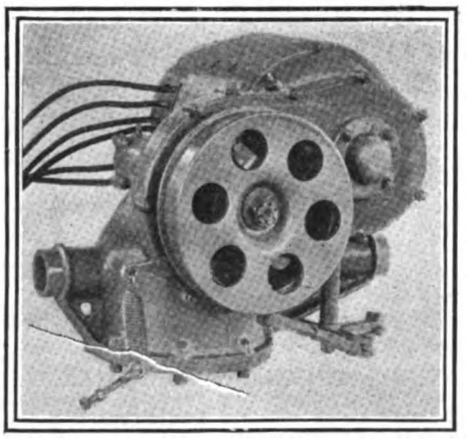


Fig. 1—Motor and gearing unit of Crescent electric stevedore, showing brake on worm shaft

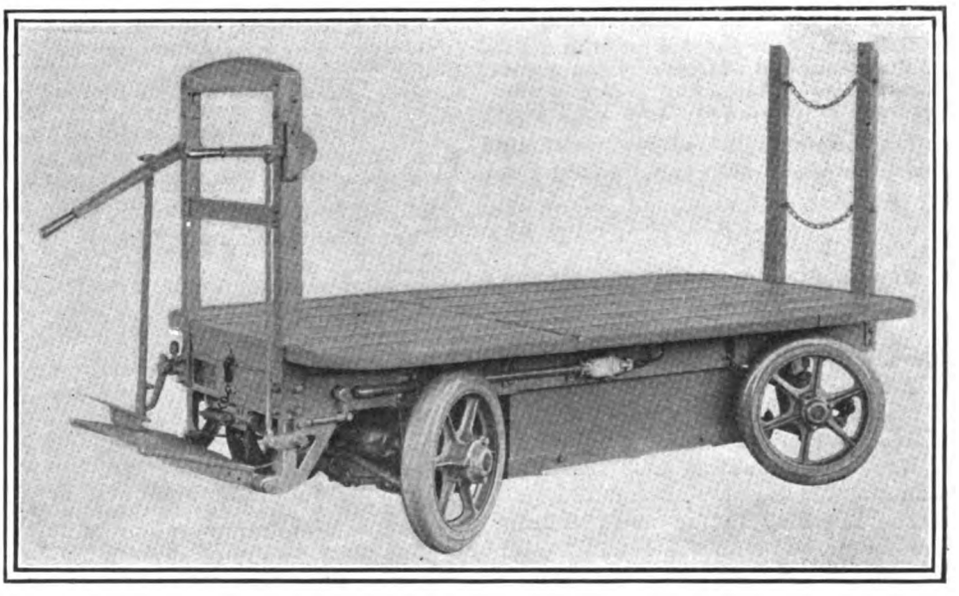


Fig. 2—Four-wheel-steered Crescent vehicle complete

Control is by the usual two-lever system, one lever operating the controller and the other being used for steering. A pedal on the floor serves to release the spring-actuated internal brake on the idler shaft and the platform itself serves to work the cut-out when the driver's weight is removed from it. The platform may be folded up to provide clearance in passing at close quarters.

The loading platform is of wood with steel straps running its length. Wheels are of cast steel with standard S. A. E.-sized industrial truck solid tires.

Specifications	
Capacity	4,000 lb.
Wheelbase	58 in.
Tires, front	20 x 3½
Rear	20 x 3½
Speeds forward	3
Reverse	3
Speed, maximum, light	10 m.p.h.
Loaded	7 m.p.h.
Primary reduction	Spur-gear
Final drive	Worm
General Measurements	
Track	36 in.
Turning circle	15 ft.
Load platform, length	90 in.
Width	48 in.
Height from ground	23 in.
Overall length	9 ft. 3 in.
Maximum grade negotiable	15 per cent

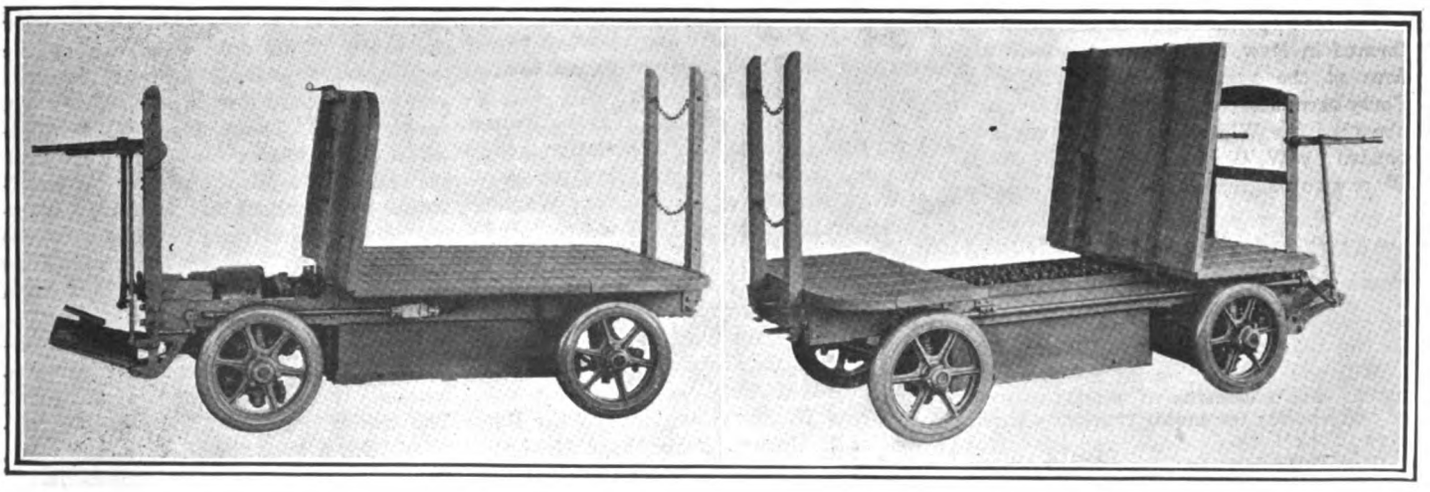


Fig. 3—Views of Crescent industrial truck, showing how platform opens to afford access to motor and battery

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STEEL TRUCK WHEEL MAKERS

Nine Makers of Cast and Pressed Steel Wheels for Trucks

To the Editor, COMMERCIAL VEHICLE:

Will you please furnish me with a list of the names and addresses of the manufacturers of steel wheels for motor trucks?—E. CONNOLLY, New York City.

The following list of manufacturers make cast steel wheels suitable for motor truck use:

Buchanan Electric Steel Co., Buchanan, Mich.

Dayton Steel Foundry Co., Dayton, Ohio.

Johnson Steel Wheel Corp., Boston, Mass.

Michigan Steel Casting Co., Detroit.

Otis Elevator Co., New York City.

Smith Wheel Co., Syracuse, N. Y.

West Steel Casting Co., Cleveland, Ohio.

The following list of manufacturers produce pressed steel wheels suitable for use on light or heavy-capacity trucks:

Buchanan Electric Steel Co., Buchanan, Mich.

French & Hecht, Davenport, Ia.

Hydraulic Pressed Steel Co., Cleveland, Ohio.

PARTS FOR WHITE STAR

Metropolitan Motors Absorbed Brooklyn Concern

To the Editor, COMMERCIAL VEHICLE:

Can you advise me where repair parts for the White Star truck, formerly manufactured in Brooklyn, can be secured?—SERVICE, New York City.

The Metropolitan Motors Co., recently formed in New York City, and with offices at the present time at 220 west Forty-second street, New York City, has absorbed the White Star company. It is headed by W. C. Mack, one of the Mack Bros. who originated the Mack truck.

MAKERS OF TRUCK BODY HOISTS

Four Concerns Specialize in Elevating Body Mechanisms

To the Editor, COMMERCIAL VEHICLE:

Will you please give me a list of the names and addresses of manufacturers of body hoists for motor trucks?—M. B., New York City.

The following concerns manufacture motor truck body hoists:

Hydraulic Hoist Mfg. Co., St. Paul, Mich.

Littleford Bros., Cincinnati, Ohio.

Meisel Press Mfg. Co., Boston, Mass.

Wood Hydraulic Hoist & Body Co., Detroit.

PRESENT AT ALBANY HEARING

Gothamite Wants Names of Men and Organizations Represented

To the Editor, COMMERCIAL VEHICLE:

Will you please furnish me with a list of the men who were present at the first hearing of the New York State Commission, held in Albany on Nov. 21 last, to determine a new schedule of motor bus and motor truck fees based on the extent of use and of wear and tear of roads by such vehicles? Will you kindly state what concerns or associations these men represented?—C. M. GEIGER, Peter Doelger Brewing Company, New York City.

George H. Pride, Oscar W. Shadbolt, Arthur J. Slade, Albert F. Masury and Roderick Stephens, president of the Motor Truck Club of America, were present in a committee to represent the Motor Truck Club.

Charles Thaddeus Terry represented the National Automobile Chamber of Commerce and the Automobile Trade Association of New York.

N. F. Towner, an Albany attorney, represented the Fifth Avenue Coach Company, New York City.

M. T. Bender, counsel for the New York State Automobile Association, represented that body.

A. A. Keesler of the Watson Wagon Company, Canastota, N. Y., represented the Trailer Mfrs. Assn. of America.

E. L. Viets represented the B. F. Goodrich Company, Akron, Ohio.

A. Jackson Marshall represented the Electric Vehicle Section of the National Electric Light Assn.

Eugene W. Stern, engineer of the Bureau of Highways, Borough of Manhattan, New York City, was present as an individual to obtain information.

MARTIN TRAILERS FOR FARM USE

Detroiter Asks Adaptability of Device for Farming Work

To the Editor, COMMERCIAL VEHICLE:

I am informed that THE COMMERCIAL VEHICLE is an authority on the problems pertaining to hauling with motor vehicles. The device that appeals to me is the trailer made by the Martin Rocking Fifth Wheel Co., Springfield, Mass. I understand this trailer is adapted for use in connection with Ford passenger cars. Before buying such a vehicle for my farm, I would like the disinterested opinion of a magazine which is as well informed as THE COMMERCIAL VEHICLE must be.—EMILY REEK, Detroit.

Semi-trailers for Ford passenger cars such as the Martin device to which you refer are undoubtedly of much utility around the farm and by the method of fitting a fifth-wheel on the rear deck of a Ford roadster enable the vehicle to be easily transformed from a purely passenger car to a commercial vehicle of about 1-ton load capacity and *vice versa*. The trailers can be used for the haulage of a multiplicity of goods about the farm, such as green goods, hay, building materials such as shingles, lumber, cement, etc., and even live stock such as chickens, pigs, calves, etc. The Martin semi-trailer is in reality the rear end of a wagon and by the use of two or more such units, the Ford may be kept busy at all times of the day by loading one of the semi-trailers while the goods in that attached to the Ford is being delivered.

Due to the use of the patented Martin fifth-wheel, strains which might be set up in the Ford due to the relative position of the semi-trailer when going over the crests of hills or when one of the trailer or car wheels drops into a rut are compensated for in the fifth-wheel device itself. The placing of the fifth-wheel on the rear deck of the Ford over the rear axle also enables the semi-trailer to be backed into position. Carrying some of the trailer weight over the rear axle also enables the rear Ford tires to secure greater traction than would be the case were this not done.

The Martin fifth-wheel can be installed complete in about 30 minutes without the aid of any special tools. The trailer portion of the outfit is supplied with a 12-ft. body, 42 inches wide, inside. The rear wheels are 45 in. in diameter with 1½-in. rubber tires.

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DID G.M.C. CROSS CONTINENT?

Railway Editor Had Not Heard of Overland Freighting Run

To the Editor, COMMERCIAL VEHICLE:

Kindly look at the inclosed clipping from *Popular Mechanics* of recent date showing a picture of a truck which is said to have run from Seattle to New York City with a ton of freight and advise if the news item is correct. I assume that if the event happened as stated it is within your memory and the answer to my question will not be difficult. What is the name of the truck and how many horsepower?—B. B. ADAMS, associate editor, *Railway Age Gazette*, New York City.

The item as published in our contemporary is correct. The truck did cross the continent from Seattle to New York, a distance of 3,710 miles, carrying its full capacity load—1½ tons. It left Seattle on July 12 and reached New York September 19, or 69 days elapsed time—many a railroad shipment takes longer from consignment to receipt.

The route was through Spokane, Wash., Butte and Miles City, Mont., Bismarck and Fargo, N. D., St. Paul, Minn., La Crosse, Wis., Chicago, Cleveland, Buffalo, Albany and New York.

The run was held under the auspices of the Seattle Chamber of Commerce, delivering 1 ton of Carnation condensed milk to a New York distributor. The truck was a G.M.C., built by the General Motors Truck Co., Pontiac, Mich. It was a stock truck throughout, with 3¾ by 5 cylinders, rating 22.5 horsepower by N.A.C.C. formula.

A complete illustrated account of the trip was published in THE COMMERCIAL VEHICLE of October 1, 1916, on page 11.

MAKER OF LITTLE GIANT TRUCK

Chicago Pneumatic Tool Co. Manufactures This Make of Vehicle

To the Editor, COMMERCIAL VEHICLE:

Kindly let me know where to buy parts for the Little Giant truck. I need both the bottom and top of the crankcase. Please let me know as soon as possible; I looked up the books but could not find their ads.—LOUIE HOCKER, Passaic, N. Y.

Parts of the Little Giant truck may be purchased at any branch of the Chicago Pneumatic Tool Co., manufacturer of the vehicle. The New York address of the Chicago Pneumatic Tool Co. is 52 Vanderbilt Avenue. The home office is at Chicago.

WEST MAKES FLANGED WHEELS

Cleveland Wheel Maker Announces One-piece Attachment

To the Editor, COMMERCIAL VEHICLE:

In the November 15 number of THE COMMERCIAL VEHICLE, on page 27, inquiry is made for flanged wheels for rails to use on motor trucks.

We beg to advise you that the West Steel Casting Co., Cleveland, O., produces such a wheel and will be glad to receive inquiries for them.

The type of wheel that we manufacture has the hub cast integral with the wheel and the tread is machined with accuracy to suit the rail conformation, Master Car Builder Standard, for the highest efficiency.

The hubs are machined to fit the bearings that are used with the axles supplied by various manufacturers and we guarantee the wheels for service.—GEORGE L. LAVERY, western manager, West Steel Casting Co., Chicago.

AN ADJUSTABLE NON-SKID CHAIN

Standley Device Has Turnbuckle Adjustment and Is Fixed on Wheel

To the Editor, COMMERCIAL VEHICLE:

Will you please advise me of the name and address of the manufacturer of a non-skid device for solid or pneumatic tires which consists of a series of cross chains attached to hooks on the felly of the wheel at one side and to a free ring on the other? As I understand it, the ring has a turnbuckle in it to permit of the adjustment of the cross chains over the tire tread.—CHARLES FINNEGAN, Bridgeport, Conn.

The non-skid tire device to which you probably refer is called the Standley and is made by the Standley Skid Chain Co., Boone, Iowa.

The device was illustrated and described in the August 1, 1916, issue of THE COMMERCIAL VEHICLE, page 34.

WHEELS FOR RAILWAY TRACKS

Now Two Makers of Flanged Wheels for Commercial Vehicles

To the Editor, COMMERCIAL VEHICLE:

We have read some articles in your publication regarding the application of a special flange to standard motor truck wheels for operating on standard-gauge railroads, but have up to the present time been unable to find out who manufactures this class of equipment.

We are having some demands for this application and will appreciate it if you can give us the name of the manufacturer of this flange.—G. W. WILLER, assistant sales manager, Indiana Truck Co., Marion, Ind.

So far as is known there is but one maker who makes a specialty of attachments for flanging standard truck wheels, although many such attachments have been made on special order. There is another concern which manufactures entire steel wheels, fitted with flanged tires to go on in place of the standard truck wheels, on the standard axles. These are the Goodman Co., Harrin, Ill., and the West Steel Casting Co., Cleveland.

Some Rikers on the Mexican border are fitted with a type which quickly clamps over the rubber tires, increasing the overall diameter slightly, but not too much to enable the truck to negotiate any grade commonly found on railroads.

HOLT BUILDS CATERPILLARS

Westerner Has Front Drive Invention—Wants Tractor Maker's Address

To the Editor, COMMERCIAL VEHICLE:

Please give the address of the Caterpillar Tractor Mfg. Co. I wish to ask you whether you think there would be any demand for a front drive for motor vehicles or trucks. I have two inventions of front-driven chainless drives. Please send me the mentioned tractor company's address.—LAWRENCE BEDARD, Waterloo, Ia.

The manufacturer of the Caterpillar tractor is the Holt Mfg. Co., Peoria, Ill., and Stockton, Cal. The word Caterpillar is not a generic word describing a particular construction, although commonly so used, but it is the trade-marked name of the special product of this concern. Other manufacturers of track-laying tractors and trucks are:

Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Bates Tractor Co., Lansing, Mich.
C. L. Best Gas Traction Co., Oakland, Cal.
Bullock Tractor Co., Chicago.
Lombard Tractor Co., Waterville, Me.
Phoenix Mfg. Co., Eau Claire, Wis.
Yuba Construction Co., Marysville, Cal.

There is no mechanical reason why a front drive, if efficient and not too expensive to manufacture, should not be successfully manufactured in this country, since front-driven Latil tractors have been used in France for many years with considerable success. From the sales standpoint, however, the manufacturer would have to overcome selling resistance due to the unaccountable prejudice on the part of most buyers against anything but the conventional, orthodox design. The four-wheel drive, however, seems to have intrenched itself in the public approval as a practicable vehicle and no doubt the inventions referred to might be adapted to a four-wheel-driven design.

RUSSIAN WANTS TRACK-LAYERS

Has Heavy Loads to Transport—Names of Three Tractor Makers

To the Editor, COMMERCIAL VEHICLE:

Some time ago you have been kind enough to send me a copy of specifications of 1916 commercial gasoline vehicles. I have now an inquiry for some types of vehicles which I do not find in these specifications, namely, tractors, by the names of Holt, Western and Implement. Can you perhaps give me addresses of the factories which make them? Also can you give me names of some good first-class tractors of the caterpillar type and of large horsepower for transmission of heavy cargoes?—R. POLIAKOFF, M.E., Moscow, Russia.

The manufacturer of the Holt tractor and of all of the track-laying or creeper-driven forms will be found in the answer to the inquiry above.

The other two tractors are unknown.

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Accessories for the Truck

HYDRO-CARBON PREVENTATIVE

To prevent the formation of carbon by humidifying the mixture, the Hydro-Carbon Preventative has been produced by the Hydro-Carbon Preventative Co., 3029 Third avenue, New York City. It consists of a small cast iron vessel clamped to the exhaust pipe. It has an inlet, connected with the overflow pipe of the radiator and an outlet which is inserted into the hot air tube of the carbureter. It also has an overflow. In action the water or steam which ordinarily issues from the radiator overflow is conducted instead to the Hydro-Carbon Preventer, where it is heated by the proximity to the exhaust pipe and is drawn off in vapor from through the outlet and carbureter to the cylinders. The device is attached without drilling any holes in any part of the chassis.

IMPROVED SCHUM BOLT LOCK

Improvements in the Schum nut lock, produced by Schum Bros., Metropolitan Tower, New York City, without altering its principle of operation, have made it easier to operate, eliminating extra or special tools.

The Schum lock comprises a thin threaded lip on one side of the bolt, actuated by a spring plunger within the bolt so that when released it moves out of alignment with the bolt threads and engages one of ten slots in the nut, thus locking it in place positively.

Formerly the plunger extended beyond the end of the bolt and had to be pressed in with an extra tool or with a special wrench. In the improved form the plunger does not come to the surface, and its hole is threaded to receive a threaded pin. When this pin, provided with a knurled knob, is screwed in, the plunger is forced in and the lip forced into alignment with the threads. Then the nut may be turned on in the usual way. When the nut is turned up, removing the threaded pin permits the lip to spring out of alignment and to engage with one of the slots in the nut.

The appliance may be fitted to any standard design of bolt and nut, it merely being necessary to cut the slots in the nut, these being very small and shallow; to drill a small hole in the bolt, then saw a slit in the bolt, insert the spring and the plunger with the lip attached and then fill the slot with metal slugs. This may be done before the bolt is machined or after, as desired.

Schum Bros. are not manufacturing the device, but are licensing manufacturers to use it.

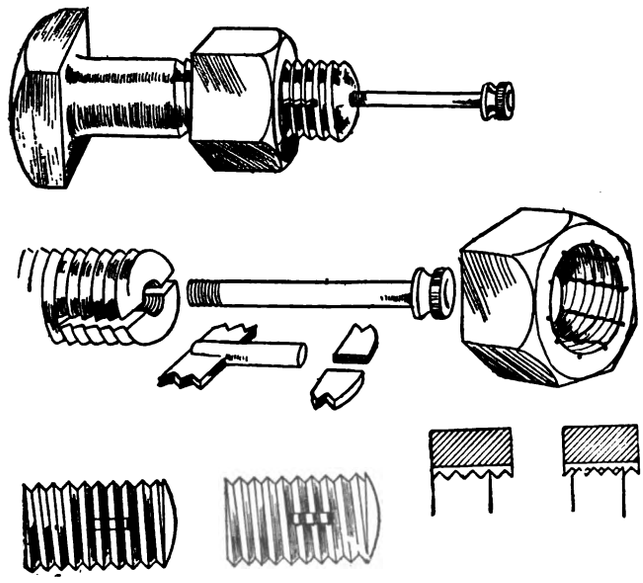


Fig. 1 — Improved Schum nut lock. Top view, complete, with threaded pin inserted to unlock the nut. Middle view, parts disassembled, and interior view of nut. Below, detail of lip in unlocked and locked positions, views externally and in section

BIG 4 COMBINATION TIRE

A compromise between the reliable, non-puncturable solid tire and the resilient pneumatic, the Big 4 tire is manufactured by the Big 4 Tire & Rubber Co., Cleveland.

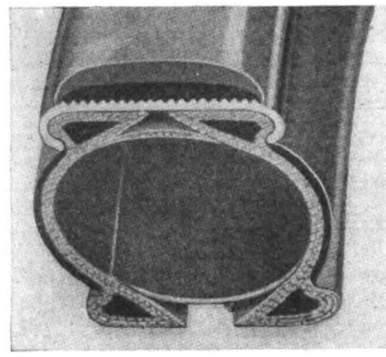


Fig. 2—Big 4 combination pneumatic and solid tire in single form

The tire comprises a pneumatic casing with two beads, one held in the wheel rim and the other on the reversed rim on the steel-based solid rubber tread. Thus, there are two separate rims and two distinct tires. The inner tire is like a standard pneumatic casing except that it has two beads instead of but one and no tread. It therefore consists of two portions. One rim is attached to the felloe band of the wheel in the usual manner, and is of standard size. The other faces inward and is secured to the steel base of the tread. The tread is substantially a steel-based solid tire except that its tread is of much less depth than the usual solid, since it is for wear only. An inner tube of the usual sort is used within the pneumatic section.

One pair of side-walls should outlast several treads, which can be replaced as easily as a pneumatic tire. For spares, one tread and one side-wall are all that are needed besides tubes. There is far less likelihood of trouble with the tire than with the standard type of pneumatic, it is claimed, since the tread is non-puncturable and due to the fact that the entire pneumatic section shares the load, lower pressures are used.

Only 25 lb. pressure is required for a 34 by 4 tire as against 80 lb. for the same size in the pneumatic type.

The tire is made in both single and dual types and special non-skid treads are made for winter use. The dual tire uses only one pneumatic section — of great relative width—and two treads.

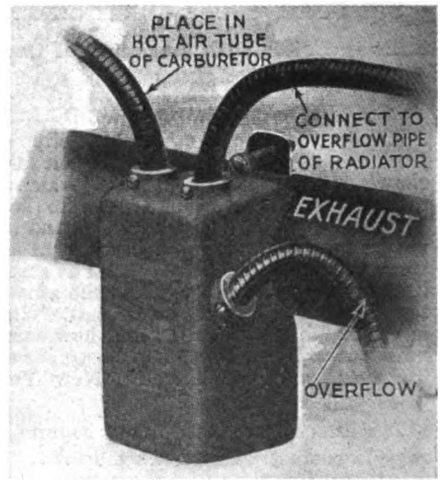


Fig. 3—Hydro-Carbon Preventative installed on exhaust pipe

LALLY MOTOR TREADMILL

Designed to permit any motor vehicle to be used as a stationary powerplant for odd jobs about a farm, store or factory, the Lally Motor Treadmill has been produced for some time by the Lally Commercial Body Co., Everett, Mass. The design has recently been improved. It comprises a frame on skids incorporating a line shaft, jacks and a draft device which lifts the rear end of the vehicle from the ground and draws the traction wheels into contact with a pair of pulley wheels to drive the line shaft.

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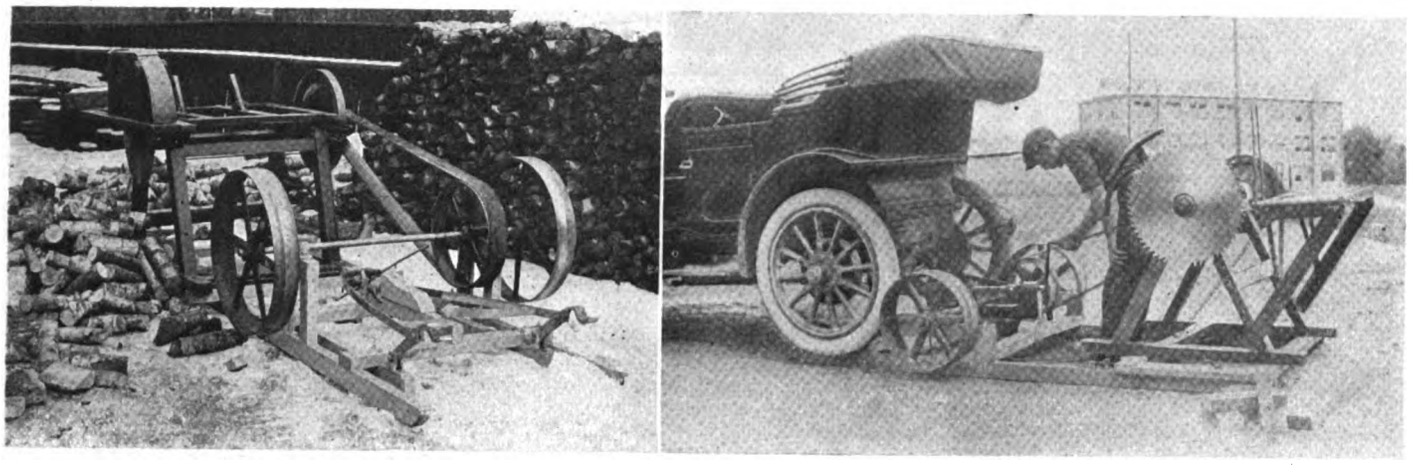


Fig. 4—Lally motor treadmill, left, and applied to a touring car for sawing wood, on the right

A belt over a smaller central pulley serves to drive whatever machinery is to be operated.

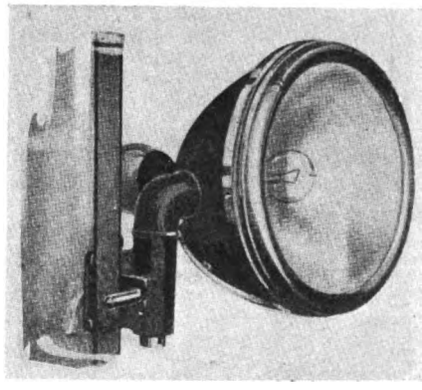
In use, the vehicle is backed to position in front of the treadmill, with its two wheels in line with the outer pulleys on the line shaft. The jacks are then raised, so that the drivewheels of the vehicle clear the ground. A turn or so on a conveniently-located crank then serves to draw the pulleys against the tires of the vehicle wheels with sufficient pressure to secure a non-slipping drive and the vehicle is thrown in gear in whatever speed is desired. In the illustrations it is shown operating a circular saw for cutting wood.

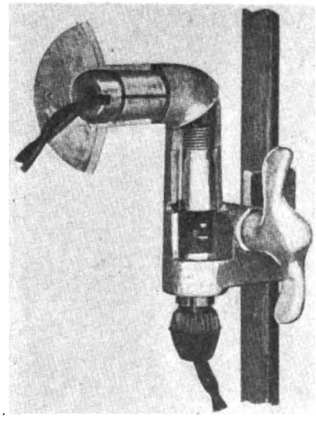
BRIDGEPORT SEARCHLIGHT

Combining the functions of a spotlight and a trouble light, the lamp manufactured by the Bridgeport Metallic Wks., Bridgeport, Conn., commends itself to the truck user on account of its compactness and simplicity. The spotlight is of the usual type, with a large knob at the back for adjustment. This knob is a hollow ball, spun on, not soldered. In its shank is the switch. This switch is of the push-button type, controlled by a plunger which passes clear through the shank. It is pushed in one direction to light the lamp and in the reverse direction to extinguish it.

The swivel bracket has a clamp designed to fit any windshield, and carries the wires within it. The joint has no springs, but instead has tapered brass bushings under friction tension, adjusted by a large thumb nut.

The mirror is of the reducing type and acts as a door. It opens on hinges, giving access to the interior of the lamp. Between the parabolic reflector and the lamp body is a space in which is coiled a length of extension cord. This door also gives access to the focusing device, its inclosure preventing accidental change in adjustment in handling the lamp or the switch. Complete instructions are pasted to the inside of the door.





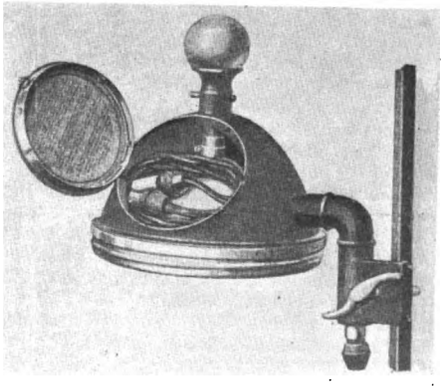


Fig. 5—Bridgeport Searchlight. Above, complete as mounted on the side of the windshield. Middle, sectional view of the bracket, showing how wires are carried within it and the large thumbnut. Below, mirroscope opened to reveal trouble cord, adjusting device and directions

In using the extension cord the door is opened and the cord withdrawn. The front of the lamp is then opened and the bulb removed. The plug end of the cord has a bayonet end, the same size as the bulb, so it is merely plugged in instead of the bulb. The bulb is then plugged into the receptacle at the other end of the cord.

This method of carrying the extension cord eliminates having to search for it under the seat or in the tool box and protects it from damage and water. The complete lamp is priced at $12.50.

JOHNSON'S CARBON REMOVER

For removal of carbon deposit in gasoline engines, Johnson's Carbon Remover is produced by S. C. Johnson & Son, Racine, Wis. The remover is a liquid which is poured in small quantities into the cylinders where it loosens the carbon from the walls, piston heads and valves so that when the motor is re-started the deposit is blown out through the exhaust.

It is claimed to be uninjurious to metal or to the hands, although it must not be spilled upon varnished surfaces, or if so, wiped off immediately.

In use, from 1 to 3 ounces, according to the size of engine, is poured into each of the cylinders through the pet-cocks or the spark-plug hole and the engine revolved with the switch off three or more times to distribute the fluid over the surfaces, and then allowed to stand for from 3 to 12 hours. The engine should be cold or nearly so when the remover is applied. After standing the required length of time, the engine is started and raced until by the odor of the exhaust the operator knows that the carbon remover has all been blown out.

The remover is of a sticky consistence when in the cylinders and large engines are difficult to start again after the remover has been injected. For this reason the Johnson company recommends that two cylinders at a time be treated. The engine may also be primed with gasoline, if desired.

In blowing out the remover, the carbon is ejected from the exhaust in red-hot flakes and in the form of black smoke.

The remover is put up in cans of 1 pint and up. The pint cans sell for $1 and should do for at least three applications in a medium-sized engine.

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Men and Makers



ACASON MOTOR TRUCK CO., Detroit, has just moved into its new factory location, at 429 Brooklyn Street in that city. The present plant has three times the floor area of the factory previously occupied. The Acason concern had outgrown two other plants before it moved into its latest home.

Four Wheel Drive Auto Co., Clintonville, Wis., is now erecting a new brick warehouse for the storage of rough castings used in its F. W. D. motor truck. The new building is 40 by 100 feet.

A Packard Branch has been opened in Wichita, Kan., by the Packard Missouri Co., Kansas City. It is in charge of G. Anderson, who formerly sold the Packard line in St. Louis and Kansas City.

A Rochester, N. Y., Selden Branch has been established by the Selden Motor Truck Co. of the same city. It will operate as the Selden Motor Truck Sales Co., and will be under charge of George S. Holvey, who formerly was at the head of the Holvey Motor Truck Sales Co. in the same city.

Chicago Republic Truck Co., distributor for Republic trucks in Illinois, Wisconsin, northern Indiana, and upper Michigan, opened a new salesroom and service station at 1702 Michigan avenue on December 1.

Stewart Motor Sales Co., Columbus, Ohio, has been organized by Capt. Ira I. Morrison and Norton Monsarrat, two Columbus men, for the purpose of handling Stewart trucks in Columbus and the central Ohio territory. The salesrooms and service department are located at 103 South Front Street.

J. B. Howard Motor Sales Co., St. Louis, Mo., has been formed to handle the sale of Old Hickory trucks, made by the Kentucky Wagon Mfg. Co., Louisville, Ky., in the Missouri and southern Illinois territory. J. B. Howard, president and manager of the concern, has been a motor vehicle salesman in St. Louis for the past 13 years.

Torbensen Axle Co., Cleveland, Ohio, formerly the Torbensen Gear & Axle Co., has incorporated under the Ohio laws to comply with the legal technicality necessary for the change of name. There has been no change in the management or the stock control of the concern, whose main offices and factory are now at East 152d Street, Cleveland.

Kelsey Wheel Co., North Memphis, Tenn., and Detroit, will consolidate its two factories, bringing the Detroit plant to Memphis. This will increase the capacity of the latter plant, which now produces 2000 complete motor vehicle wheels per day.

Doehler-Die Casting Co., Brooklyn, N. Y., has just awarded a contract for a concrete-and-steel addition to its plant in that city. The new structure will be 50 by 100 feet, seven stories high, and will cost about $150,000.

American Truck and Wheel Corp., Chicago, was recently formed in that city for the manufacture of motor truck wheels. Those interested in the new concern are William C. Loftus, John R. Cavanaugh, and Ross J. Cavanaugh.

Smith-Form-a-Truck Sales Co., Indianapolis, Ind., has opened new quarters at 1327 East Washington Street in the same city.

Smith-Form-a-Truck Co., Chicago, has established a branch in Kansas City under the direction of F. J. Line, city manager. The increase in sales has made it necessary to establish more branches to keep up with the work.

Western Massachusetts Longford Co., Springfield, Mass., has moved from 35 Essex Street to larger quarters at 453 Worthington Street.

Pull-More Motor Truck Co., New Castle, Pa., has broken ground for the erection of a new plant. The company is capitalized at $800,000, and employs 300 workmen.

Kelly-Springfield Tire Co., New York City, has just opened a new factory branch in Baltimore, Md. It is under the charge of H. H. Grobe, formerly manager of the truck tire sales department at the New York City branch. Carl Spoerer's Sons Co., which formerly handled the Kelly-Springfield line, has become agent for Republic tires.

Kelly-Springfield Tire Co., New York City, is erecting two temporary frame buildings at its Akron, Ohio, plant. These will serve as a restaurant, now on the top floor of the main building, and for the experimental department. In this manner space needed in the main building for other purposes will be obtained, pending the removal of the concern's equipment to Cumberland, Md.

Goodyear Tire & Rubber Co., Akron, Ohio, has leased 10,000 acres of cotton land near Chandler, Texas. It has engaged E. W. Hudson, formerly a cotton expert for the Government, to take charge of the plantation. Egyptian cotton for the manufacture of motor vehicle tires will be raised, according to the present plan.

Firestone Tire & Rubber Co., Akron, Ohio, has filed papers with the secretary of state for increasing the authorized capital from $4,000,000 to $15,000,000. A large part of the additional capital will be taken by present stockholders in the concern. Additions to the plant will be constructed, and the business will be enlarged generally.

Marvel Accessory Mfg. Co., Cleveland, Ohio, is building a new factory which will add more than 45,000 square feet of working space to the present plant. It will be equipped with the latest and most efficient machinery obtainable. The construction of the new factory has been made possible by an increase in the concern's capitalization to $100,000. The Marvel company produces a number of motor vehicle accessories, including vulcanizers, adjustable socket wrenches, valve grinders, and a combination tire chain fastener and tire tool.

National Carbon Co., Cleveland, Ohio, maker of batteries, plans the erection of a new factory building costing $1,000,000. The concern has just purchased a parcel of land across Berea Road from the present plant. The new tract comprises 63 1-3 acres, with a frontage of 3368 feet.

Edward H. Belden, for the past 2 years consulting engineer of the Packard Motor Car Co., has recently been appointed chief engineer of the Willys-Overland Co., Toledo, Ohio. Mr. Belden was formerly mechanical engineer with the McCormick Harvester Co., and later electrical engineer of the Fort Wayne Electric Co., and subsequently held the same position with the Westinghouse Electric & Mfg. Co.

Arthur E. Corbin, for the past 6 years assistant sales manager of the Packard Motor Car Co., Detroit, has recently resigned, after having acquired an interest in the Pluym-Ochs Co. of Petrograd and New York, one of the largest Russian importers of American motor vehicles and accessories. Mr. Corbin will develop the organization of the Pluym-Ochs company in advance of the expansion which that concern contemplates when the war is over. Mr. Corbin will leave in a few weeks for his permanent post in Petrograd. Before his 6-year term at the Packard plant in Detroit he was truck sales manager of the Packard branch in New York City.

C. R. Norton, manager of truck sales for the Packard Motor Car Co., Detroit, has recently become general sales manager of the same concern.

H. H. Hills, sales manager of the Packard Motor Car Co., Detroit, has been made assistant general manager of the same concern.

G. R. Bury, formerly manager of carriage sales for the Packard Motor Car Co., Detroit, is now assistant general sales manager of the same concern. His promotion and that of H. H. Hills and C. R. Norton have been made to adjust the organization following the resignation of A. E. Corbin.

Day Baker, formerly manager of the agency department of the General Vehicle Co., Long Island City, N. Y., and who resigned from that company on October 1 last, as reported in the November 15 issue of THE COMMERCIAL VEHICLE, has returned to Boston, Mass. He will enter the motor vehicle business for himself, having secured the New England distributorship for the Atlantic electric truck. It is also understood that he will represent one make of gasoline motor truck in the same territory. The New England section of the National Electric Light Assn. has elected him chairman of its Electric Vehicle Committee, and he has been made treasurer of the gasoline truck dealers' association.

W. E. Kenyon, formerly sales manager of the Sandow Motor Truck Co., Chicago, has resigned to accept the position of sales manager for the Chicago Republic Truck Co., Chicago, distributor of Republic trucks in Illinois, Wisconsin, northern Indiana, and upper Michigan.

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M. E. Kern has purchased a tract of land in Allentown, Pa., on which he contemplates erecting a plant for the manufacture of motor trucks.

L. B. Dudley has been appointed advertising manager of the Federal Motor Truck Co., Detroit, succeeding George W. Cushing, resigned. Mr. Dudley was formerly identified with the Campbell-Ewald Co., Detroit, advertising agents. Dudley is well qualified to take up his new work, having had 12 years' experience in the editorial and advertising departments of newspapers and having been with the Campbell-Ewald company for the past 3 years, where he handled the advertising of the Federal truck company.

Frank B. Dawson, for several years manager of the Mogul Truck Co., St. Louis, Mo., has resigned. He will become identified with a new company in Chicago which will begin the manufacture of motor trucks about January 1, 1917.

B. F. Wright, chief engineer of the Federal Motor Truck Co., Detroit, has just returned from Pittsburgh, Pa., where he and E. A. Haskins, service manager of the same company, have been checking up the performance of one of the Federal 5-ton experimental models.

C. A. Erickson, formerly chief engineer of the Scripps-Booth Co., Detroit, is now with the Jacobson Machine Mfg. Co., Warren, Pa., for which he has designed a new type of four-wheel-driven motor truck. The first of the new model is to be completed shortly.

Edward F. Swift, vice president of Swift & Co., Chicago, has been elected a director of the Willys-Overland Co., Toledo, Ohio.

J. A. Bulman, formerly associated with the Federal Motor Truck Co., Detroit, has been made chief accountant for the Acason Motor Truck Co., also of Detroit.

William R. McCulla, formerly one of the motor engineers for the Packard Motor Car Co., Detroit, has joined the engineering forces of the Willys-Overland Co., Toledo, Ohio.

H. M. Leonard, chief engineer of the Duplex-Power Car Co., Charlotte, Mich., has resigned to develop an invention of a four-wheel-driven farm tractor. The L. M. H. Development Co. has been formed as a holding company, with a capital of $30,000, to build the demonstrating tractors. Another company is to be organized about July 1, 1917, for the manufacture of the tractor. The invention is said to have four speeds, both backward and forward, to turn in a circle with a radius equal to its wheel base, to pull three plows, to weigh 3300 lb., and to sell for $800. Work already has begun on the demonstrating models.

Edward A. Dauer, formerly a truck dealer at Providence, R. I., and lately in charge of the New England territory for the Chase Motor Truck Co., Syracuse, N. Y., has been promoted to be manager of agencies throughout the United States for that company. He will make his headquarters at the factory at Syracuse, N. Y., when not traveling.

Officers of the Selden Truck Sales Co. Rochester, N. Y., were elected at the annual meeting at the company's plant in that city on November 6. The following directors were elected: George C. Gordon, William C. Barry, Jr., Robert H. Salmons, Henry G. Strong, and Charles H. Stearns. All of the former officers were elected, as follows: George C. Gordon, president and treasurer; William C. Barry, Jr., vice president, and Robert H. Salmons, secretary. An interesting announcement was read at the meeting, in which it was stated that the company's October business showed an increase of 349 per cent over the same period of 1915. The increase was in domestic orders only.

S. R. Scott has been appointed district sales representative for the Denneen Motor Co., Cleveland, Ohio, maker of Denmo trucks. Mr. Scott is well known in the motor truck trade, having been connected with the White Motor Co., and more recently with the Warner-Swasey Co., as works manager. Mr. Scott has left on an extended trip throughout the northwest, in which he will travel from place to place with a Denmo truck.

L. R. O'Connor has been appointed manager of purchases for the Acason Motor Truck Co., Detroit. Mr. O'Connor was formerly identified with the Trio Mfg. Co., Standard Motor Truck Co., and the Continental Motor Co.

S. F. Cruickshank and E. Colburn have recently joined the production department of the Acason Motor Truck Co., Detroit.

T. P. Myers, formerly manager of the motor truck division of the Packard Motor Car Co. in New York City, has joined the staff of the General Engineering Co., Detroit. He will have charge of the development of the Doble steam power plant design for the motor truck field.

C. L. DuPuy, for the past 5 years representative for Selden trucks in the territory of which Atlanta, Ga., is the center, on December 1 became southern district sales manager for the Selden Truck Co., Rochester, N. Y. His new territory will comprise the States of Georgia, Florida, Alabama, Mississippi, and Louisiana. He will make his headquarters in Atlanta, Ga.

A. E. Gluck, purchasing agent for the Packard Motor Car Co., New York City, has resigned to become president and general manager of the Abbott Motor Equipment Co., New York City, distributor of motor vehicle accessories. He is succeeded in the Packard organization by H. T. Stevenson.

Walter Y. Anthony, an efficiency expert, has been appointed assistant manager of the Philadelphia, Pa., branch of the Packard Motor Car Co., Detroit.

Norman Halliday, manager of the Mack Motor Truck Co. at Boston, Mass., reports that October was the best month in the history of his branch. He sold thirty-seven trucks, of which twenty-one were repeat orders.

Herbert W. Little, formerly New England zone service manager for the Willys-Overland Co., Toledo, Ohio, has been transferred to the factory of the same concern. He will be succeeded by F. H. White.

L. C. Long, formerly New England sales manager for the Federal Motor Truck Co., Detroit, has returned to his previous position of vice president and city sales manager of the Chicago branch of the same concern.

W. C. Vliet, formerly branch manager of the Studebaker Co., Washington, D. C., and later wholesale manager of L. Markle & Co., Chicago Studebaker distributors, has taken over the Republic line of motor trucks in Washington, D. C.

Adolph Geisel, formerly associated with the Federal Motor Truck Co., Detroit, and later with the Martin Rocking Fifth Wheel Co., Springfield, Mass., has been appointed Federal sales manager for the New England territory.

James Coggeshall has been appointed manager of the wholesale department of the R. E. Taylor Corp., New York City, distributor for Garford trucks in that city and in New Jersey and New England.

Butler-Veitch Co., Berkeley, Cal., has recently been appointed distributor for Denmo trucks, made by the Denneen Motor Co., Cleveland, Ohio, in the territory surrounding the California city.

R. E. Arter has recently been appointed general manager of the Federal Motor Truck Co. at Providence, R. I.

Z. B. Leonard has resigned as chief of the laboratory forces of the Perfection Spring Co., Cleveland, Ohio.

E. Ray Shaw has taken the agency for the Smith Form-a-Truck for southern New Hampshire, and is making Nashua his headquarters.

Parke G. Sedley, formerly manager of the New York City branch of the Heinze Electric Co., Lowell, Mass., has joined the sales organization of the Eisemann Magneto Co., Brooklyn, N. Y. For the present he will be located at the general office in Brooklyn, but on or about January 15, 1917, will take charge of the direct branch of the company to be opened in Chicago. Mr. Sedley had been connected with the Heinze company for 3 years.

Earle & Boggs, 1790 Broadway, New York City, have been appointed eastern representatives for the Fuller & Sons Mfg. Co., Kalamazoo, Mich., maker of motor truck parts. The territory under the charge of the new representatives includes the States of Massachusetts, Rhode Island, Connecticut, New York, Pennsylvania, Maryland, Delaware, and the District of Columbia.

H. S. Graves has recently been appointed sales engineer of the Russel Motor Axle Co., North Detroit, Mich., maker of internal-gear-driven axles for motor trucks.

Fred E. Boylan, formerly manager of the Detroit branch of the Swinehart Tire & Rubber Co., is now factory representative of the Sewell Cushion Wheel Co., Detroit. He will divide his time between the company branches in Cleveland, Buffalo, Rochester, Boston, New York City, Philadelphia, Baltimore, Pittsburgh, Cincinnati, St. Louis, Chicago and Minneapolis.

A. E. Hertzig, manager of the Baltimore, Md., branch of the Goodyear Tire & Rubber Co., Akron, Ohio, has also been appointed manager of the Washington, D. C., branch of the same company, and will have charge of the territory in both sections.

L. J. Gemmil, formerly manager of the Washington, D. C., branch of the Goodyear Tire & Rubber Co., Akron, Ohio, will now take charge of all the Goodyear business with the United States Government.

F. J. Firestone was elected vice president of the Firestone Tire & Rubber Co., Akron, Ohio, at its annual meeting. He is succeeded as general sales manager by A. G. Partridge. F. C. Blanchard was elected manufacturers' sales manager at the same meeting.

D. T. Hastings has recently been appointed chief engineer of Holley Bros. Co., Detroit, maker of the Holley carbureter.

A. A. Gloetzner, formerly chief manager of the Bour-Davis Co., has become chief engineer and manager of sales for the Covert Gear Co., Detroit.

Arthur W. Moyer, formerly identified with A. R. Mosler & Co., has resigned his position with the Champion Ignition Co., Detroit, and will return to his original business, the Moyer-Shaw Mfg. Co.

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C. F. Mitchell, manager of the Milwaukee branch of the Prest-O-Lite Co., Inc., in the same city, has been promoted to division manager, with headquarters in the same city. He is succeeded by E. P. Drummond.

Harry Hucknell has become manager of the Los Angeles, Cal., branch of the Splitdorf Electrical Co., Newark, N. J. He was treasurer of the same company in California and manager of the San Francisco branch for the past 2 years.

Arthur V. Farr, for the past 3 years advertising manager of the S. K. F. Ball Bearing Co., Hartford, Conn., has resigned to accept the position of sales manager of the Hess Steel Corp., Baltimore, Md.

Maurice Brennan has become identified with Hertz & Co., engineers, New York City, in an executive capacity. For the past 3 years he was secretary of the Duplex Engine-Governor Co., Brooklyn, N. Y.

Dr. Emrich W. Ritter, a Cleveland chemist serving a term in the Ohio penitentiary for conspiracy, has applied for patents on a new process of manufacturing gasoline from natural gas, which he claims is seven times more efficient and six times less expensive than the present gasoline used. Some time ago he obtained considerable notoriety by claiming to have invented a liquid-fire to be used in war.

Harvey W. Robinson, for many years identified with the New York Edison Co. in New York City, on November 1 resigned his position with that organization to join the Guaranty Securities Corp., in the same city. The latter concern has only recently adopted a time-payment plan for the sale of motor trucks, as described in the November 15, 1916, issue of THE COMMERCIAL VEHICLE.

Forschler Motor Truck Mfg. Co., Inc., New Orleans, La., made its first display of 1- and 2-ton trucks built in the plant of the former Forschler Wagon & Mfg. Co. at the recent national farm and live stock show in New Orleans.

Federal Trucks Were Exhibited at the National Dairy Show, October 12 to 21, at Springfield, Mass., and the National Convention of the American Electric Railway Assn., held in Atlantic City, N. J., October 9 to 13. The trucks shown were equipped with bodies especially adapted to the work in which the delegates to the two conventions were most vitally interested.

Contracts for Bosch Magnetos have just been consummated between the Bosch Magneto Co., New York City, and the following motor truck concerns: Independent Auto Truck Co., Davenport, Iowa; Lewis-Hall Iron Works, Detroit; Hahn Motor Truck & Wagon Co., Hamburg, Pa.; Available Truck Co., Chicago; Durable Dayton Truck Co., Dayton, Ohio, and the Twin-City Four Wheel Drive Co., St. Paul, Minn.

A Timken Co-operative Grocery Store is planned by the Timken-Detroit Axle Co., Detroit, to reduce the cost of living for its employes. It will be known as the Timken-Detroit Co-operative Store, and will sell food staples to all of the 3300 employes at the lowest possible prices. The store will be under the supervision of L. R. Judson, welfare manager for the company.

A Million Dollar Employes' Welfare Fund was recently voted by the Firestone Tire & Rubber Co., Akron, Ohio. This will be used for the insurance of the workmen and also for benefit payments in time of death or sickness. The Firestone company 2 weeks ago opened its new clubhouse, said to have cost over $300,000.

Australia's Imports of Tires in the first six months of 1916 reached a value of $2,558,538. Of this amount the United States supplied $1,793,826 worth, Canada $164,531, France $129,055, Italy $33,304, Japan $11,120, the United Kingdom $422,266, and all other countries $4,536 worth.

A Danish Firm Wants to Sell American Trucks, according to a foreign trade opportunity published in the November 18, 1916, issue of *Commerce Reports,* which states that the company referred to wishes to handle American commercial vehicles in Norway and Sweden, as well as Denmark. The inquiry is known as No. 23,036. Further information may be obtained from the Bureau of Foreign and Domestic Commerce, Washington, D. C., or from any of its branches in the large cities throughout the country.

Trucks for Denmark are desired by a manufacturers' agent in that country who wishes to enter into business relations with an American manufacturer of commercial vehicles. This foreign trade opportunity is given No. 23,101 by the Bureau of Foreign and Domestic Commerce, Washington, D. C., from which any additional information may be secured.

"White Good Roads Trucks" is the title of a comprehensive fifty-six-page book just issued by the White Co., Cleveland, Ohio. It is a book which should prove of much value to highway engineers, roadway commissions, and city, town, and village authorities at large. The book illustrates the White good roads trucks and the White combination truck used for road surfacing during the open season and for the haulage of other goods during the winter months by the ability to remove the complete tank and oil-spraying apparatus. It then describes the work of these two types of vehicles in all sorts of road building and road maintenance work in a large number of states throughout the country, giving in each instance many illustrations showing the vehicles actually at work, and in some instances cost data which should prove of much value. The book is characterized chiefly by the great number of illustrations which it contains, there being no less than 187 shown in its fifty-six pages. Complete specifications and body sizes for both types of vehicles are included. The book is mailed *gratis* to any contractor, county commissioner, or engineer.

Soldier Employees of the R. E. Taylor Corp., New York City, eastern distributor for Garford trucks, are being paid full wages as long as they remain in Uncle Sam's services. Two salesmen of the Taylor organization have been at the Mexican border since the militia was mustered into the Federal service. One of these salesmen is a member of the Twenty-second Regiment New York Engineers, and the other a member of Battery A, New Jersey Field Artillery.

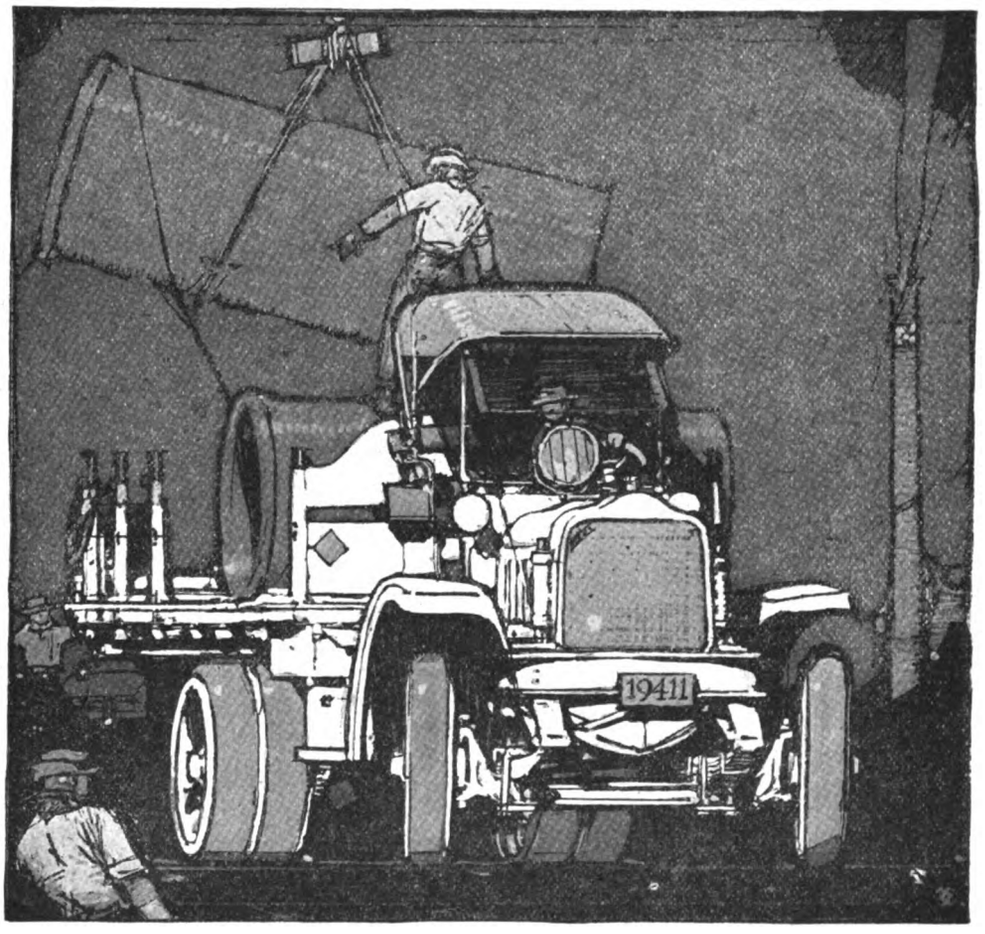
An International Catalog of Wilson Trucks has just been issued by the J. C. Wilson Co., Detroit, in which the specifications of its 2-tonner are given in six different languages, including English. The others are French, Spanish, Russian, Italian and German. Besides giving the specifications, the book is also well illustrated with views of the Wilson chassis, the parts which enter into its manufacture and others depicting the truck actually at work in various lines of business. The catalog is printed on 7 x 8 buff paper, with bleeding edges in darker brown. It has a stiff cardboard cover with red lettering.

A New Firestone Catalog just issued by the Firestone Tire & Rubber Co., Akron, Ohio, is a well-gotten-up picture book of what one would see if he made a trip from one end of the large Firestone plant to the other. It is a forty-page book, whose purpose is to show the progress made by the Firestone organization, not alone by its factory, but by its men and its branches as well. The illustrations are large and clear, and take one through the various steps taken in the Firestone plant to turn the crude rubber biscuits into finished solid and pneumatic tires, tubes and tire accessories. These illustrations give one almost as good idea in 5 min. as to how tires are made as could be obtained by a visit of several hours at the factory. In addition to the plant illustrations, the various Firestone branch buildings are also shown, as well as an eight-page spread of Firestone employees at the factory and at the annual outing at Mr. Firestone's family homestead. The book is 10 x 13½ in., with a heavy cardboard cover in brown.

"Efficient Methods in Making Brake Lining Renewals" is the title of a small leaflet just issued by the General Asbestos & Rubber Co., Charleston, S. C. The leaflet is well illustrated by line cuts showing exactly how the old brake lining can be removed and the new one attached in the easiest possible manner. These illustrations are almost self-explanatory, and the leaflet should prove of much value to those users of motor vehicles who would like to do the work of relining their own brake bands themselves.

United Motors Catalog, just issued by the United Motors Corp., New York City, is an elaborate seventy-two-page book descriptive of the plants and products of the five motor vehicle parts concerns which form the United Motors organization. These include the Dayton Engineering Laboratories Co., Hyatt Roller Bearing Co., New Departure Mfg. Co., Perlman Rim Corp. and the Remy Electric Co. The book is divided into five sections or chapters, one for each of the companies which compose the affiliated concern. Both the plants of each company and its products are profusely illustrated by many half-tones. Some of the views of the products are of the shadow type, with the parts described in bold relief and the remainder of the mechanism to which they are attached air-brushed. A feature of the catalog is an eight-page folded-over insert at the center. Four pages of this insert are employed to depict a composite bird's-eye view of the plants of the five organizations which form the United Motors concern. Statements of facts and figures on the reverse side of the insert point out that the total number of buildings is 110, with a floor area of 2,449,229 sq. ft., and that 14,000 are employed. It is further pointed out that the total horsepower used in the five plants is 13,680; that the number of companies served is 10,318; that the number of vehicle owners served is 3,500,000, and that the number of assembled parts produced is 94,400 daily and 28,320,000 annually. The catalog is printed on coated paper 10 x 12 in., with a gray art cover.

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More White Trucks are put into service each year than trucks of any other make.

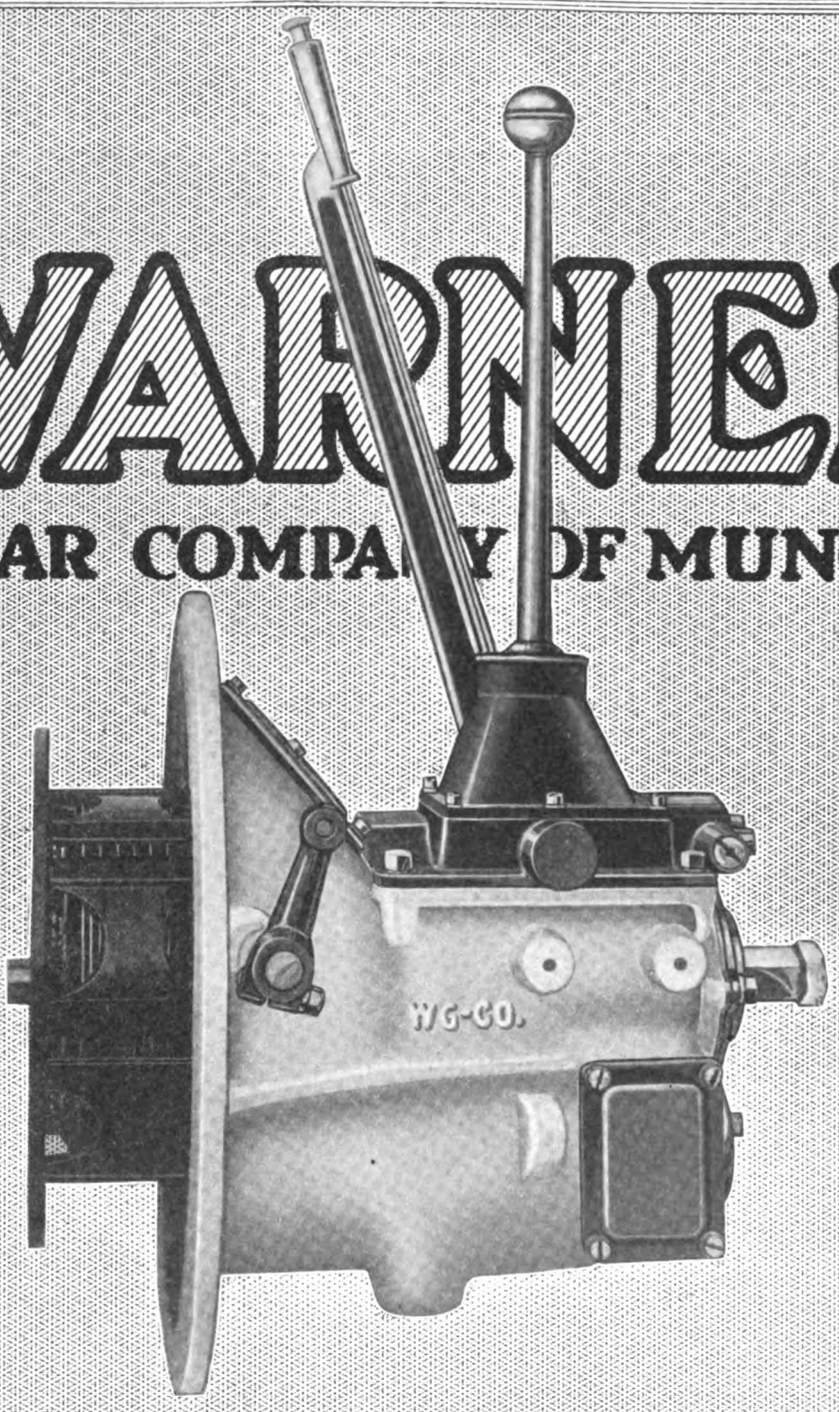
It is a significant fact that the majority of these trucks are purchased in fleets by large motor truck owners whose only criterion of value is performance in terms of eventual cost.

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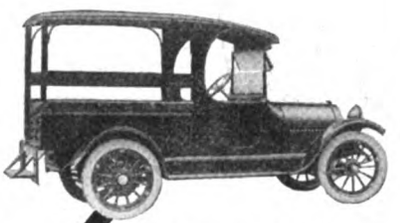
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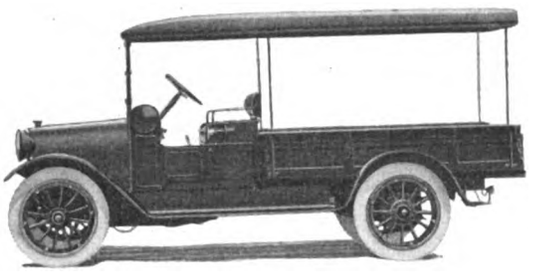
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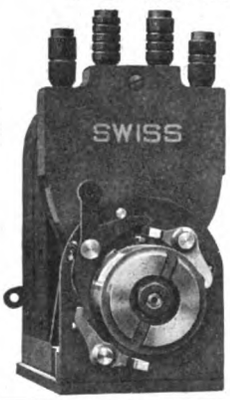


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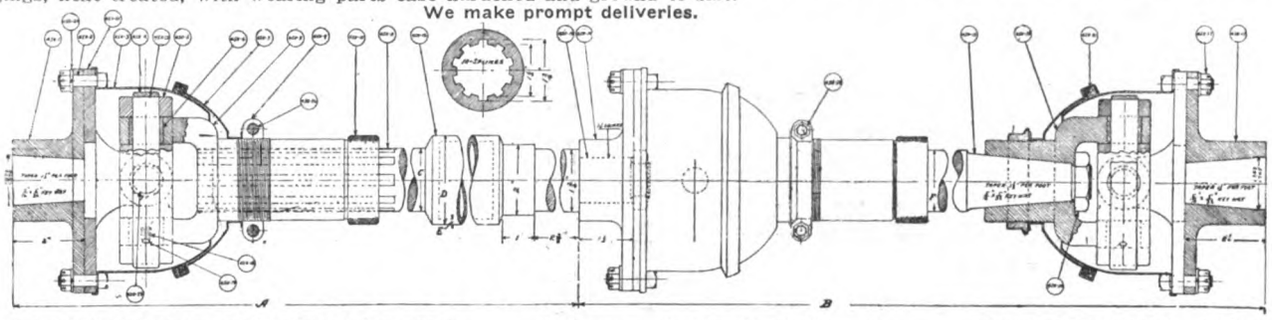
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Don't wait until the real cold weather sets in and the streets are covered with ice and snow, before getting "NEVER - SKIDS" for your motor trucks.

THE NEW TYPE
NEVER-SKID
practically eliminates vibration

Does away with skidding and affords positive traction on slippery streets. The cross-pieces are made of the finest quality woven steel wire — strong enough for the heaviest machines made.

The device can be applied in a few minutes without jacking up the truck, and there is no danger of its catching in driving chains or damaging tires.

YOU WILL SURELY NEED "NEVER-SKIDS" this winter.
Why not get them now?
Folder and prices will be gladly sent

NEVER-SKID MFG. CO.
122 Liberty Street, New York, N. Y.
New England Distributor: WILLARD B. DAVIS, 39 Danforth Street, Fall River
Chicago Distributor: FRED ALLEN AUTO SUPPLY CO., 1610 S. Michigan Avenue

MONARCH of the TRUCKS

The Four Wheel Drive Truck has earned a world-wide reputation for dependability of performance under the severest tests.

The dealer who offers them for sale is fortified with a set of selling facts that make him **invincible in competition.** Too many to enumerate here.

FWD

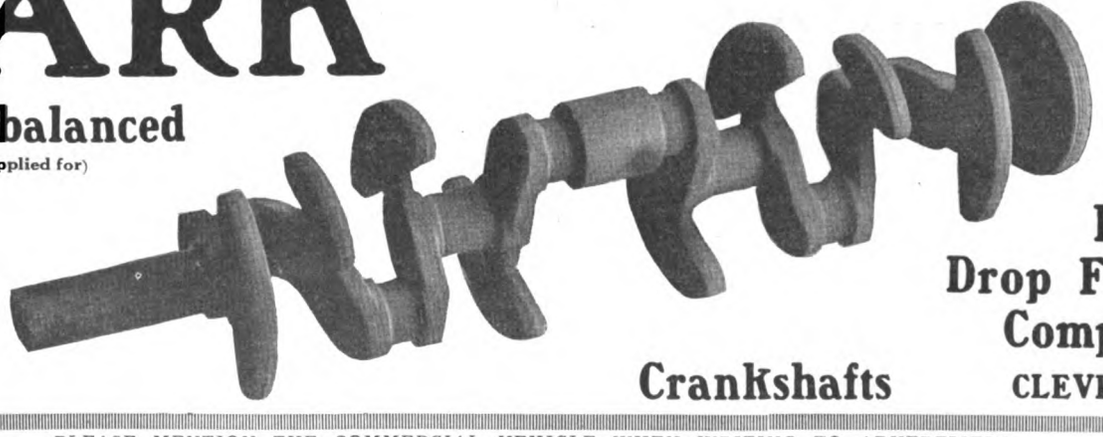
Our literature goes into particulars. Ask us **today** to send it to you.

FOUR WHEEL DRIVE AUTO CO.
Dept. K
Clintonville Wis.

PARK

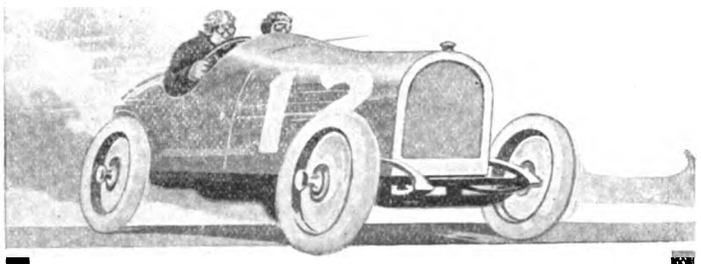
Counterbalanced

(Patent Applied for)



The Park Drop Forge Company
Crankshafts CLEVELAND

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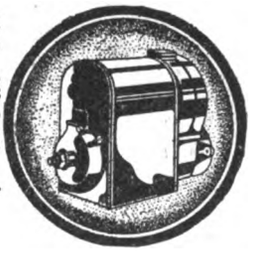
Faster! Faster! Faster!

Speed—power—they call for *perfect ignition*—a spark so flashing, burning hot that the mixture doesn't matter. Richest mixture to leanest, you'll get a full explosion every time if you have an

EISEMANN MAGNETO

Just as good at lower speeds, too. Even when your motor is barely turning over, the Eisemann spark is hot and powerful.

EISEMANN MAGNETOS are so dependable and efficient that 108 manufacturers of Pleasure Cars, Trucks, Tractors, etc., have adopted them as standard equipment. That should means something to you!



THE EISEMANN MAGNETO CO.

Sales and General Offices
32-33d St., Brooklyn, N. Y.

802 Woodward Ave., Detroit, Mich.

U. S.

U. S. Ball Bearings

are essential to the continued satisfaction of your car.

U. S. Ball Bearings have proved their ability to transmit all the power you pay for and to minimize the upkeep of your car.

At axle ends, on steering knuckle heads, in each side of the differential, next to the driving pinion and in the transmission; in fact, everywhere bearings are used in a car, U. S. Ball Bearings are giving dependable and lasting satisfaction.

Made to meet every possible radial, combined and thrust load.

Write for Catalog F. It will give you full and detailed information.

U. S. BALL BEARING MFG. CO.

(Conrad Patent Licensee)

Palmer St. and Kolmar Ave., Chicago, U. S. A.

"Get the Quality" **Booth** "Get the Quality"

IF you buy felt washers simply by the price, you can always find some that are lower priced than ours. But if you care for quality, service and perfection, BOOTH'S are the lowest priced washers made.

BOOTH FELT COMPANY, Inc.

440-450 19TH STREET BROOKLYN, N. Y.

116-118 South 5th Avenue Chicago, Ill.

There's An Easier, Safer Way

Instead of always having to help your brakes this way, why not put in Thermoid Brake Lining and let the brakes do their full work? That is easier and safer everywhere—on hills, at crossings and especially just before the accidents that might have happened.

Thermoid
HYDRAULIC COMPRESSED
Brake Lining-100%

Thermoid never lets go. Always it has that steady, friction gripping power that means safe stopping. It contains more material than any other brake lining. It is compressed under hydraulic pressure into a solid, unyielding substance thoroughly impregnated with a friction compound impervious to heat, water, oil, gasoline or dirt.



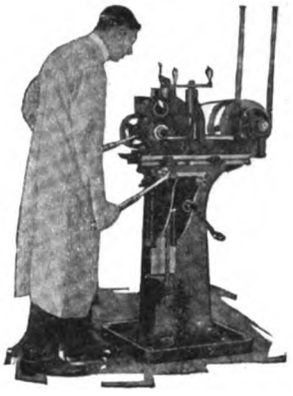
Cannot be burned out nor affected by oil, heat, water, gasoline, dirt.

Thermoid Rubber Company

Trenton, New Jersey

Makers of a full line of automobile accessories and mechanical rubber goods.

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Equip Your Garage with a Whitney Hand Miller

so you won't have to turn away profitable repair business, or turn it over to the machine shops.

With this all-round machine you can handle the work in your own garage. You can avoid delays; you can accommodate customers.

The Whitney will take care of any milling job in the line of auto repairs. With it you can cut gears, cams, sprockets, do key seating, straddle milling, profiling, slotting, slabbing, drilling, die sinking and countless other operations.

Simply send a postal for Catalog No. 7

The Whitney Mfg. Co. Hartford, Conn.

Chains—Keys—Hand Milling Machines.

THE MARK OF A BETTER RADIATOR

G & O RADIATORS

for

Heavy Duty Service

The G & O Mfg. Co.
New Haven, Conn.

The Star Union Brewing Co., of Peru, Ill., is duplicating—

The Worm Drive GARY TRUCK

—now on duty in Peru, for its Peoria branch.

It's the same story we've had to tell ever since GARY Trucks first became established in the field—50% of our business is repeat orders from GARY owners—the best recommendation for Gary service.
Every refinement known to increase efficiency is incorporated in the GARY Truck, by expert workmen.
The result is 4 GARY models, 4 capacities at 4 prices that are right—ready to handle any load you want to move—and to give satisfaction that will make you come back for more.
Try one GARY in service with any assortment of best known trucks. Your fleet will eventually be a GARY fleet.
Dealers—Reorders and generous new business make GARY the logical truck for dealers.

Write or wire for details



THE GARY MOTOR TRUCK COMPANY
610 Broadway
Gary, Indiana

Krebs

"The Truck That Thinks"

The ideal commercial truck possesses four essentials — Simplicity — Low Maintenance Cost—High Efficiency and Absolute Dependability—That's the KREBS.

It is powerful, economical and needs no mechanic to drive it. The driver has nothing to do but steer.

The KREBS Automatic Governor positively keeps the motor at a certain speed and is assurance against the results of reckless driving.

Continental Motor, Timken Axles, Special economical KREBS Carburetor, Timken-Brown Worm Drive — are a few of the important essentials.

In ¾, 1, 2, 3, and 3½ ton capacities with bodies for any business.

Send for catalog—it will show you why you need the KREBS —the most efficient truck in the world.

The Krebs Commercial Car Co.
CLYDE, OHIO, U. S. A.

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Handle Your Time Sales on the

Guaranty Time Payment Plan



Guaranty Securities Corporation

Equitable Building, New York City

San Francisco
Hobart Building

Montreal
National Trust Company



View Without Housing

"EVANS" UNIVERSAL JOINTS

Patent Pending

Perfect in every detail. Simple in construction, with a minimum number of parts and fully self-contained. It will meet the strictest requirements from the small runabout to heavy fire-engine service.

Powerful Compact Durable

Made in four sizes up to 100 H.P.
Angle of drive up to 15 degrees.
Shafts up to 3" diameter.

Also
"Hele-Shaw" Clutches and
"M. & E." Grease Cups

MERCHANT & EVANS CO.

PHILADELPHIA

New York
Baltimore
Atlanta
Wheeling

M&E

Cleveland
Chicago
St. Louis
Kansas City

The Universal Automobile Record Book

THE object of THE UNIVERSAL AUTO RECORD BOOK is for the Owners of automobiles to keep an accurate account of all costs pertaining to the operation of their machines in a simple, compact and accurate form.

Through THE UNIVERSAL AUTO RECORD BOOK, if the record is correctly kept, the exact expense of all items can be easily arrived at and any leakage in expenses be corrected.

Through THE UNIVERSAL AUTO RECORD BOOK provision is made for the separate listing of different items of expense, also records of tire mileage, motor trips, etc.

The convenience of keeping the record of the mileage is well worth the price of the book.

THE UNIVERSAL AUTO RECORD BOOK can be carried in a convenient place in the car, either in a door pocket or under the seat or will easily fit into the coat pocket on account of the fact that the book is only 5¼" wide and only 7¾" deep.

There can be no question but that the keeping of a Record Book along the above lines would prove not only of real interest to every car owner, but will also add pleasure to the operation of the machine, and at the same time will afford a saving in the cost of operation.

THE UNIVERSAL AUTOMOBILE RECORD BOOK will be sent postpaid to any address upon receipt of 50c.

COMMERCIAL VEHICLE

239 West 39th St., New York

1000 Pound Capacity

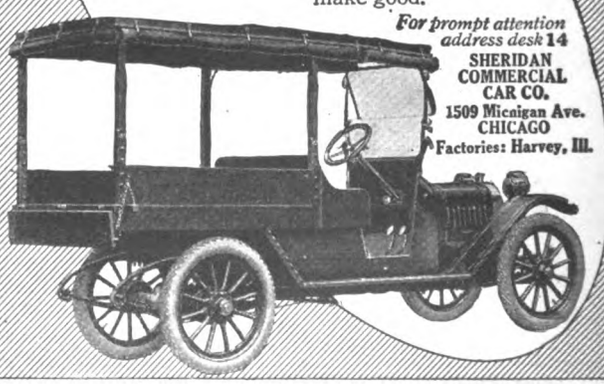
Sheridan Commercial Car

Ready for Delivery Now

Fully Equipped Price $540

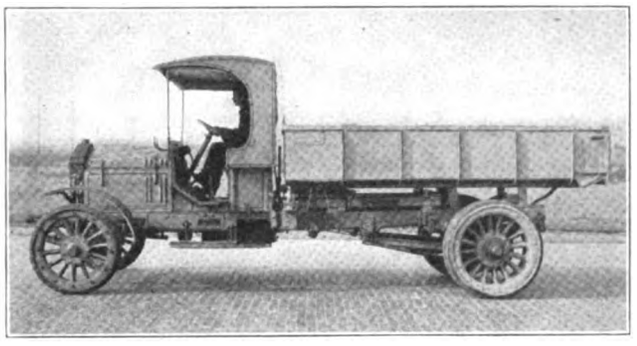
THE SHERIDAN is the lowest priced delivery car on the market. Thoroughly equipped and properly built to do the work it's designed for—haul 1000 pounds any time—anywhere. Ample in size, load capacity and power.

Sells fast to a big, ready-made field of *buyers*. Not a rebuilt pleasure car. Made a truck through and through by manufacturers of trucks, to replace horses where price is what counts. Chassis alone, $490. Fully equipped, $540. Write or wire for complete details. Make territorial reservations now. Dealers make good.

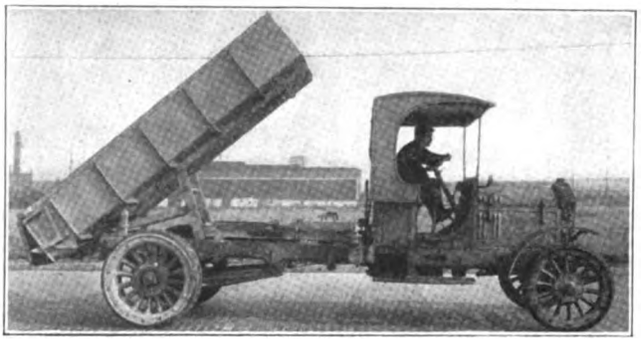


For prompt attention address desk 14
SHERIDAN COMMERCIAL CAR CO.
1509 Michigan Ave.
CHICAGO
Factories: Harvey, Ill.

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Young Hoist and Dump Body.
(Body lowered.)



Young Hoist and Dump Body.
(Body raised.)

ANNOUNCEMENT!

With unexcelled mechanical equipment and engineering staff we are prepared to fill orders promptly for

YOUNG TRADE HORIZONTAL HYDRAULIC MARK **DUMP BODY EQUIPMENT**

COMPLETE INSTALLATIONS OR HOIST OUTFITS ONLY

We strongly urge all parties expecting to place orders for this type of equipment to investigate the advantages of the YOUNG Patent Horizontal Hydraulic Hoist for Dump Trucks. Installations on many makes of trucks insure its reliability.

YOUNG PATENT HOIST COMPANY

382-388 CLINTON STREET HORIZONTAL HYDRAULIC **MILWAUKEE, WIS.**



One Thousand Miles on High Gear

OVERLOADED 20 PER CENT.

Every hill on this route through Ohio and Michigan was taken on high without straining. Read the story in our booklet "The Wizard of Trucking." Only a Six and only a "Globe" could do it on 12½ miles per gallon of gas.

Six Cylinder Motor

trucks handle like a pleasure car. Start easier. On high 1½ miles to 25 miles per hour. 11 to 15 miles per gallon of gas. Quieter operation. Minimum motor vibration. Go anywhere, any roads, any time. Agencies being established rapidly. Write today

MFG. BY

THE GLOBE MOTOR TRUCK CO.

NORTHVILLE, MICH.

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This Advertisement is Addressed to

Live, Hustling Dependable Dealers

IF Selden Trucks are not being sold in your territory, write us at once, and we will make you a REAL MONEY-MAKING PROPOSITION that will surprise you.

SELDEN TRUCKS

are a quality product. The "IN-BUILT QUALITY" that is built into them at the factory eliminates the constant call for "free service." That means satisfied purchasers—more sales and greater profits for you.

The Selden organization has built a reputation for giving REAL SERVICE, too—not promising service—but ACTUALLY GIVING REAL SERVICE WHEN IT IS NEEDED. That reputation becomes yours when you sell Selden Trucks.

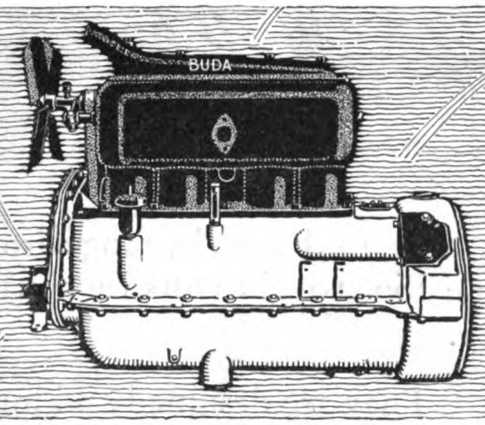
Think hard about this and write us AT ONCE.

Selden Truck Sales Co.
Rochester, N. Y., U. S. A.



PLEASE MENTION THE COMMERCIAL VEHICLE WHEN WRITING TO ADVERTISERS

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Buda Motor, "the Fine Product of 35 Earnest Years," is acknowledged the standard in its field. Its unequalled record is the result of the Buda Company's 35-year policy, "Performance, not Price."

BUDA TRUCK MOTOR

The presence of the Buda Motor in truck or pleasure car is a guarantee of quality in the vehicle through the strength of the Buda Company behind it. But, still more is it a guarantee because it is a piece of *fine machinery*, which *does its work* superbly—day after day, year after year. You will find it in many of America's greatest trucks.

THE BUDA COMPANY HARVEY CHICAGO SUBURB ILL.

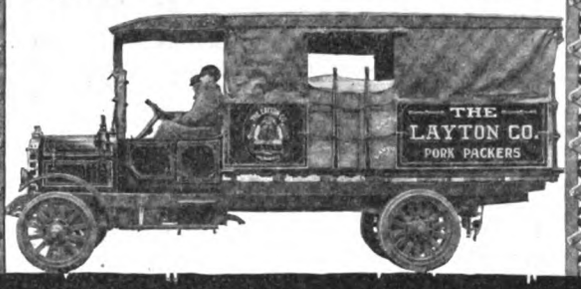
THE BUDA COMPANY BUDA MOTOR "The part to buy the car by" ESTABLISHED 1881

Sterling TRUCKS

THIS complete line of worm gear driven trucks affords the dealer an unusually profitable opportunity. Write for open territory.

STERLING MOTOR TRUCK CO.

838 Rogers Street Milwaukee, Wis.



Veeder Hub Odometer

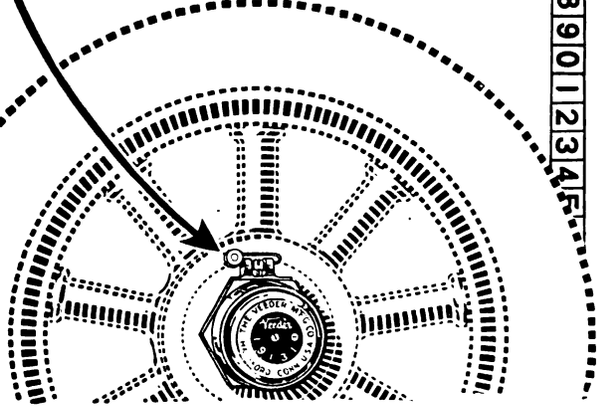
—built almost as accurately as a watch yet sturdy enough to withstand the roughest jolts it will be subjected to. As durable as your car, the Veeder Hub Odometer records every mile travelled, whether forward or backward.

It gives you the most accurate information upon which to base your truck upkeep records. Price $20. Special model for Ford cars $15.

Cyclometers, Odometers, Tachometers, and all kinds of counters. Fine Die Castings.

VEEDER MFG. CO.

54 Sargeant St. Hartford, Conn.



MONARCH

LIMITS THE SPEED AND THE EXPENSE



STOP SPEEDING

No truck can withstand the greatest of all abuses —excessive **speed.** Continuous and economical service is always sacrificed by it. Overspeeding is paid for by the shortened life of the truck.

The work of the Monarch Governor is to make speeding impossible without limiting the power.

It's the only governor designed solely for internal combustion engines. There are no revolving parts —no gears—no shafts. Nothing to get out of order, and is so simple and rugged in construction that it will outwear the truck itself.

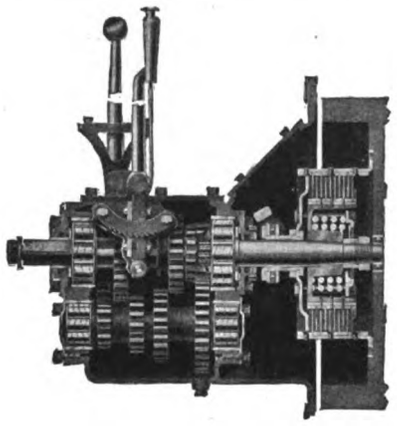
Your own experimental department can easily prove the superiority of the Monarch Governor. We'll gladly co-operate in conducting exhaustive tests. Booklet sent upon request.

Monarch Governor Company

Detroit, Michigan U. S. A.

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COVERT COVERT COVERT
TRANSMISSIONS



Made in various models for different sizes and types of cars—Covert Transmissions will free you from transmission troubles. Let us show you how they fit your construction.

Covert Gear Company, Inc.

Sales Office, Detroit, Mich.
Factory, Lockport, N. Y.

Garford
MOTOR TRUCKS

Garford Trucks range from one ton to six tons in capacity.

They are designed and built by men who have spent their lives in the study of motor trucks.

They are backed by one of the strongest organizations in the industry.

Bodies are provided to meet all requirements.

Write for catalog. Please address Dept. 103

The Garford Motor Truck Co., Lima, O.



WICHITA TRUCKS
Dependability Plus Extensive Service
ARE YOU THE DEALER

who can put into your salesmanship WICHITA Energy and Spirit and back up your selling accomplishments with WICHITA Service?
If you are such a dealer, we have an interesting selling plan that you will not want to miss considering.
The faithful co-operation of our factory organization will give you encouraging help.
We want live dealers NOW—Men who will interest concerns in our heavy-duty trucks, and then to not let up on them until they sell them.
Request us to immediately submit our plans.

WICHITA FALLS MOTOR COMPANY
Arthur Boulevard, Wichita Falls, Texas

DIAMOND T
TRUCKS

Diamond T Service is as thoroughly built into our ¾-ton trucks, the smallest of the line, as it is in our 3½ ton model.
Its low cost is made possible only by its wide popularity which has enabled us to produce this model in enormous quantities. There has been no cheapening of quality or inferior workmanship permitted in its design or construction.
For a thousand uses it is the most satisfactory and economical delivery vehicle ever marketed. With a body suited to your requirements, it will improve your delivery service while lessening your operation expense.

Write to-day for catalog.

Diamond T Motor Car Co., Chicago, Ill.



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$350 and a FORD gives you this guaranteed 1-Ton Truck



In other words, for less than half the price, you get equal carrying capacity and efficiency to trucks costing $1500 or more, coupled with FORD DEPENDABILITY, DURABILITY AND UPKEEP ECONOMY.

Here's the TRUCK everybody wants, same as the Ford is the universal car. Think of the opportunity for sales in your city on the truck that GIVES THE CHEAPEST DELIVERY COST IN THE WORLD.

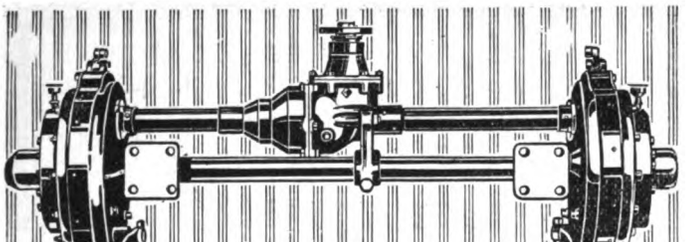
For full particulars about the wonderful Smith Form-a-Truck Attachment that instantly makes a guaranteed one ton truck of any Ford, and for OUR GREAT EXCLUSIVE DEALER'S PROPOSITION, address

Smith

FORM-A-TRUCK CO.

Suite 911, Smith Form-A-Truck Building
1470 Michigan Avenue
CHICAGO ILLINOIS





Russel

Internal Gear Drive Axles

SELLING trucks these days is not difficult, for the industries of the country are awakening to the advantages of motorized delivery.

Make your sales even easier by using trucks driven by the Russel Internal Gear Drive Axle.

Industrial preparedness demands that the most serviceable, durable and efficient form of truck haulage be adopted by you.

Adopt, therefore, a truck using The Russel Internal Gear Drive Axle

Russel Motor Axle Co., North Detroit

G. V. ELECTRIC TRUCKS

SIX MODELS: 1,000 POUNDS TO 5 TONS



Nearly 5,000 in use
Catalog on request

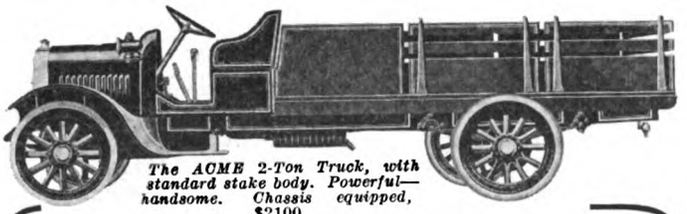
General Vehicle Company, Inc.

GENERAL OFFICE AND FACTORY
LONG ISLAND CITY, NEW YORK

NEW YORK::CHICAGO::BOSTON::PHILADELPHIA

1664

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The ACME 2-Ton Truck, with standard stake body. Powerful—handsome. Chassis equipped, $2100.

Fill Immediate ACME Orders!

DEALERS: Get the quick, profitable business of local truck buyers who know the advantages of ACME Trucks and want them for **early delivery.** The **surest selling features** to meet customers' requirements for from 1-ton to 3-ton capacities.

Clinch the ACME Agency now—and sell **easily,** with **substantial profit.** No large service to render because of fifteen famous "Proved Units" from radiator to tail light. ACMES have oversize dimensions. The 2-ton ACME has powerful 40 H. P. Continental Motor and big capacity—Chassis, equipped $2100.

ACME THE TRUCK OF PROVED UNITS

Be in a position to accept big business on our One-Ton Truck. Announcement and specifications sent on request. An all-feature worm drive ACME —$1500.

Write for Booklet, "A Business Builder," and Territorial offer today. Or WIRE—

Cadillac Auto Truck Co.
112 Mitchell Street
CADILLAC, MICHIGAN

NORTH AMERICAN MOTORS

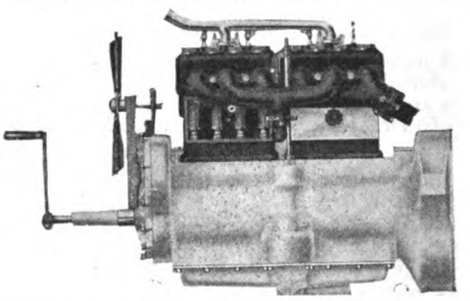
This is to announce two new models which have been added to the "N. A." line. They are: Model C, developing 20-25 H.P., and Model CX, developing 25-30 H.P.

These motors round out a line of power plants for commercial vehicles which are the most thoroughly accessible and simplest truck motors ever designed.

Full information on these new models or on our entire line will be gladly sent.

A Detroit office has been opened at 1325 Dime Savings Bank Building.

NORTH AMERICAN MOTORS COMPANY
Factory: POTTSTOWN, PA.
Detroit Office: 1325 Dime Savings Bank Bldg.



"Little Giant"



The Power-Bred Truck

MECHANICAL power is bred into the Little Giant Trucks of today—just as strength and endurance were bred into the Percherons of the past. The Little Giant is lively, responsive, like a fine-spirited horse—yet, like a young Mogul Locomotive, it is dependable twenty-four hours in twenty-four. Thousands of Little Giant owners proudly boast—"it never had a tow-rope on it yet."

THE "LITTLE GIANT" LINE INCLUDES

Model 15—1-ton Worm Drive
Model H—1-ton Chain Drive
Model H—1½-ton Chain Drive
Model 16—2-ton Worm Drive

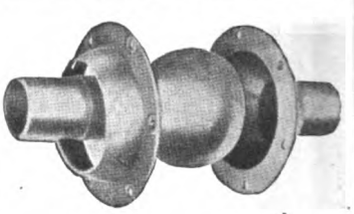
Special Bodies for Every Purpose

Agents wanted for desirable territory

CHICAGO PNEUMATIC TOOL COMPANY
1085 Fisher Bldg. CHICAGO
52 Vanderbilt Ave. NEW YORK
Branches and Service Stations Everywhere

BOSSERT

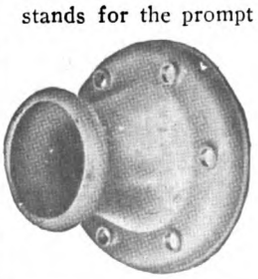
In the most perfect plant that brains, money and experience could devise, we have the men and equipment to produce pressed steel parts in any quantity on comparatively short notice.



We make more than 200 pressed steel parts and you can make your vehicles lighter and at lower cost, without sacrificing strength if you use *pressed steel* spring hangers, running boards, brake drums, etc., instead of malleable iron, steel castings and drop forgings.

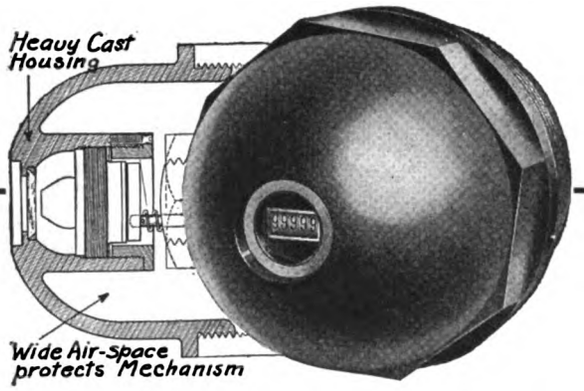
"THE BOSSERT WAY"

stands for the prompt delivery of your order filled in accordance with every item of the specifications.



The Bossert Co.
UTICA
N. Y.

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It's always working

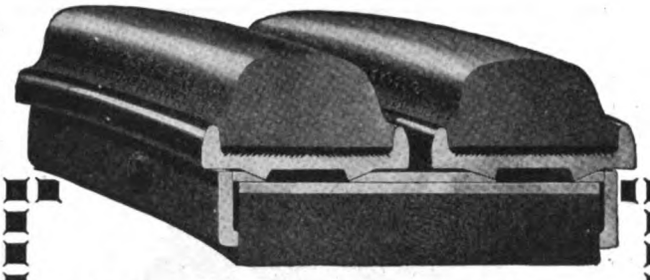
—always giving accurate mileage records—enabling you to stop the leaks and run your trucks at top efficiency.

DREADNAUGHT
Indestructible
Hub Odometer

is protected by heavy cast housing. It can't break or get out of order. A new one free if it does. Easy to read because the figures are always right side up and can't be obscured by grease or dust.

Write for Booklet and Prices.

AMERICAN TAXIMETER COMPANY
Manufacturers of Jones and Popp Taximeters
1765 Broadway, New York City



The Working Test

—the only fair way to find the real value in Firestone Truck Tire equipment is to give it the test of service.

Efficiency trials will soon show the mileage, dependability and resiliency of

Firestone

Economy and the good of the service will then demand Firestone for every road, load and condition of service. Our transportation engineers, located at all branches, are at your service.

Firestone Tire and Rubber Co.
"America's Largest Exclusive Tire and Rim Makers"
Akron, O.—Branches and Dealers Everywhere



Cullman Sprockets

For Diamond, Baldwin and Whitney Chains

Differentials

Sprockets in stock and to order

Send for Catalog

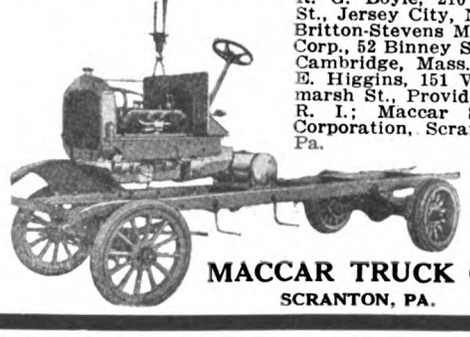
Cullman Wheel Co.
1350 Allgeld Street
CHICAGO

MACCAR

Delays Cost Money

The MACCAR never stays off the road more than 30 **minutes, because of power-plant trouble.**
If anything happens you substitute a new power-plant—no expensive tying up of your truck for time-consuming repairs.
The motor, clutch, transmission, radiator, pump, magneto, carburetor, dash and toe boards, brake and foot pedals, steering gear and all spark and throttle controls, are assembled dust-proof, in one cradle and as a Unit mounted into the frame.
Dealers will find in the MACCAR AGENCY a new and profitable proposition. Write now for details.

Distributors:
Pitts Motor Car R & S Corp., 540 Atlantic Ave., Brooklyn, N. Y.; Maccar Sales Co., 2116 Market St., Philadelphia, Pa.; Bee Automobile Co., 15 N. Church St., Allentown, Pa.; R. G. Boyle, 210 10th St., Jersey City, N. J., Britton-Stevens Motors Corp., 52 Binney St., E. Cambridge, Mass.; W. E. Higgins, 151 Whitmarsh St., Providence, R. I.; Maccar Sales Corporation, Scranton, Pa.



MACCAR TRUCK CO.
SCRANTON, PA.

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AUTOCARS

are equipped with the

"JASCO" TANK

Why? Because demonstrated service facts have proven that this gasoline receptacle makes fuel absolutely safe from fire or explosion and devotes every drop to energy.



"JASCO" TANKS are made of drawn steel. They are seamless, tinned and tested and positively cannot spring a leak even under the most severe conditions. They are money savers, life and property protectors. If your car is equipped with an old fashioned riveted tank you are courting danger. Investigate the "JASCO" today. Full details on request.

The "Jasco" Tank is used and indorsed by the following prominent manufacturers:

PLEASURE CARS

Biddle Motor Car Company, Simplex Automobile Company, Mercer Automobile Company, Lozier Motor Company, Stanley Motor Cariage Company, James Cunningham Son & Company, H. H. Franklin Mfg. Company.

TRUCKS

Baldwin Locomotive Works, Autocar Company, General Vehicle Company, H. G. Burford Company, Peerless Motor Car Company, Garford Motor Truck Company, Gramm Motor Truck Company, Thomas Auto Truck Company, Motor Trucks, Ltd., Canada.

JANNEY, STEINMETZ & CO.

Main Office: PHILADELPHIA

New York Office: HUDSON TERMINAL BUILDING

Standard

MADE IN DETROIT USA

Motor Trucks

Startled the Motor Truck Industry By a Unique Sales Plan

First of all, the Standard is an unusual truck. It is a powerful combination of many of the world's best-known units—the Continental Motor; Timken Axles; Timken Bearings; Brown-Lipe Gears, and other well-known standard parts.

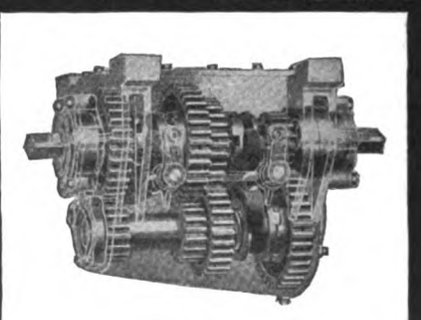
The Standard Motor Truck is sold in an unusual way. Any responsible person can be the agent for the Standard, with absolutely *no investment—no deposit* and *no contract.*

Write for details of this plan. *No obligation.*

STANDARD MOTOR TRUCK CO., 315-327 Bellevue Ave. Detroit, Mich.



COTTA TRANSMISSIONS



All Gears Always in Mesh

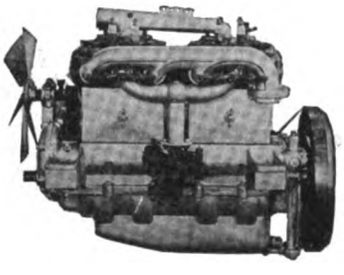
An Assurance of Dependable Service

The Cotta Transmission Co.
Rockford, Ill.

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WANTED

High-class, experienced truck salesman who can establish new dealers for an old, well-known, high-grade line of trucks—one to six tons. A superior quality product and an unusually liberal sales policy makes this an exceptional proposition and we want only exceptional men. This is a real opportunity for a successful truck man to better himself. Give us in first letter every essential fact that should influence us to pick you. Address "Sales Manager," care of this journal.



Beaver Motors Make Their Way By The Way They Are Made

BEAVER MOTORS are made by truck motor specialists. The concentrated experience of engineers of international reputation is embodied in their construction.

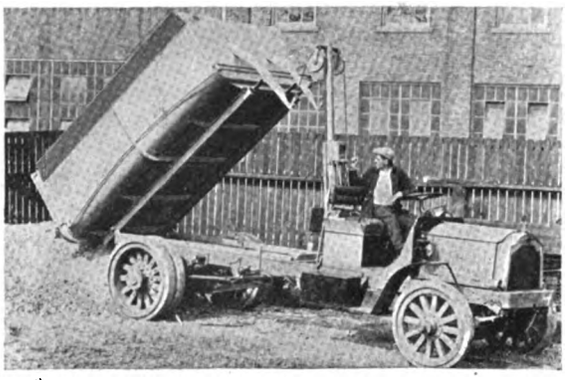
BEAVER TRUCK MOTORS are made by men who make nothing but motors—who, by doing the same thing over and over have become masters in perfection. That is why we can make truck motors better, quicker, and at less cost than the truck manufacturer himself.

We make truck motors of all sizes, for all requirements. No matter whether you are building a 1,500 pound light delivery wagon or a 5-ton truck, we can meet your demands for power, economy and dependability.

Do not determine on a motor for your truck till you have sent us your specifications

BEAVER MFG. COMPANY

Milwaukee Wisconsin



"TYPE D"
Heavy Duty Hoist with Standard Coal Dump Body

By Way of Foreword

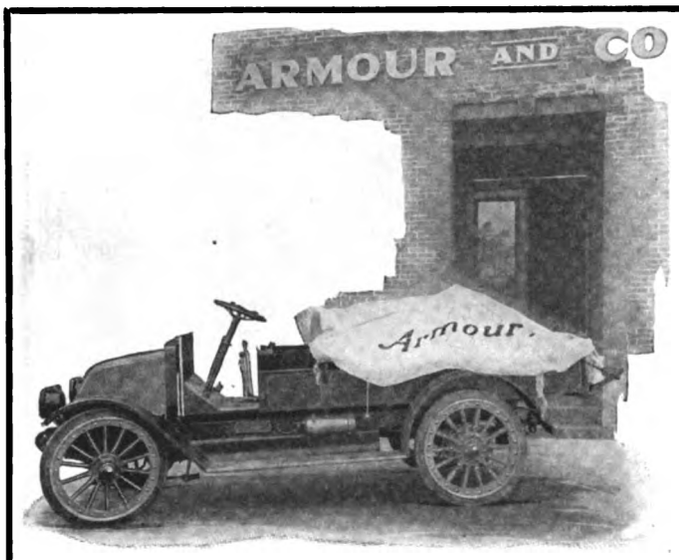
preceding an important announcement by the Wood Hydraulic Hoist & Body Company, to be made on or about January 1st, 1917, we strongly urge all parties expecting to place orders for dump body equipment within the next six months to get in touch with us by letter for advance information.

Your prompt action on this suggestion will bring you the particulars by return mail.

Wood Hydraulic Hoist and Body Co.
DETROIT

WOOD HOISTS WOOD BODIES

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The "Why" Behind International Truck Success

The **International Motor Truck** is Sold by a Company Whose Success can be Traced to the Service it Gives.

This Company maintains a complete service station in 88 principal cities throughout the United States. Each station employs expert truck men and carries a full stock of repair parts, from the smallest detail to a complete power plant. Both men and repairs are at a customer's command instantly in case of accident. We make it our business to keep our customers satisfied just as you do. We hope a buyer of an International will never have an accident, but if he should have we do not allow it to interfere with his business for one minute longer than is absolutely necessary.

These are the three models and the rock-bottom prices:
All Prices Cash f. o. b. Akron, Ohio

Model E—1500 lbs. capacity, complete with express body $950

Model H—1500 lbs. capacity, internal gear drive (chassis) 1225

Model F—2000 lbs. capacity, internal gear drive (chassis) 1500

Write for complete information on International Motor Trucks.

International Harvester Company of America
(Incorporated)
88 Harvester Building Chicago U S A

United States 'Solid Truck' Tires

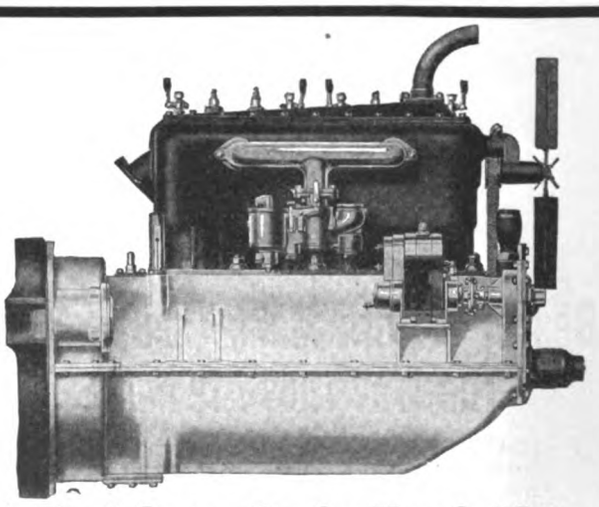
Truck Tire Efficiency

Our new, secret process compound, vulcanized under a pressure of 1,600,000 pounds (almost four times the pressure used to vulcanize ordinary truck tires) has more vitality, rugged strength and durability than any other compound manufactured.

For this reason, United States Solid Truck Tires are the strongest and most durable now on the market.

United States Tire Company
1790 Broadway, New York City

UNITED STATES RUBBER COMPANY US RUBBER SYSTEM AND ASSOCIATED COMPANIES



A Real Long Stroke Truck Motor

Type T U, 4 x 6; Type U U, 4½ x 6; cylinders interchangeable. Crankshaft, four bearing, chrome nickel steel, 2 in. diameter. Bearings, bronze, Fahrig metal lined. Camshaft, one piece, cams integral. Oiling system, force feed, hollow crankshaft.

WRITE FOR COMPLETE SPECIFICATIONS.

WISCONSIN MOTOR MFG. COMPANY
Station A, Dept. 319 MILWAUKEE, WIS.

New York Branch: 50 Church Street. T. M. Fenner, Factory Representative. Pacific Coast Representative: Earl P. Cooper Co., 1428 Bush Street, San Francisco; 333 West Pico Street, Los Angeles.

Wisconsin CONSISTENT Motors

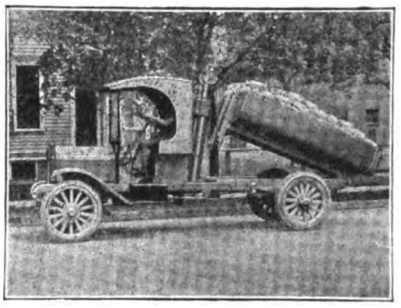
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Stegeman

SIX-CYLINDER
SELF-STARTER

WORM-DRIVE

TRUCKS



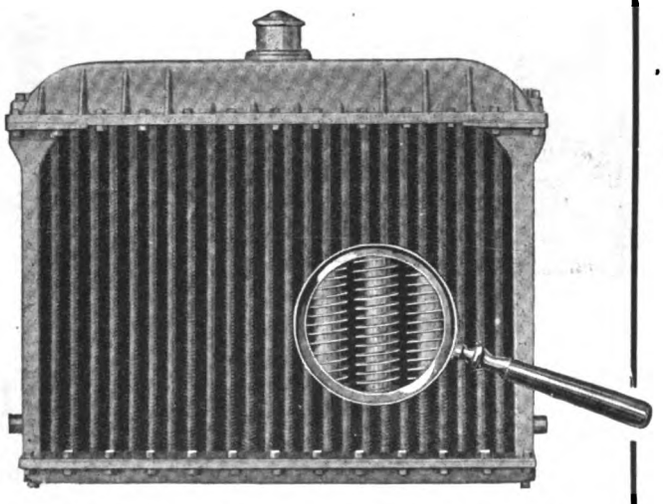
The most for your money—that's what we offer. A 6-cylinder Motor, Electric-Starter and Electric-Lights are furnished on our truck without extra charge. On any other machine they would cost $300 extra.

Ours is not the cheapest truck on the market, but it is certainly a low-priced line, quality considered.

WE WANT RELIABLE AGENTS

STEGEMAN MOTOR CAR CO.
Milwaukee, Wisconsin

Seamless Copper Helical Tube Cooling Sections

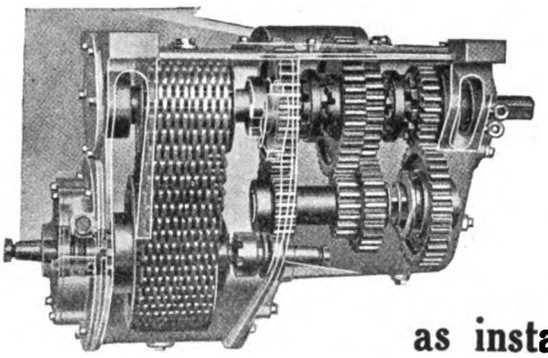


Are Guaranteed for the Life of the Motor on Which They are Installed

Helical Tube Construction is Accepted as the Best by the Leading Truck Makers of America

Manufactured only by

ROME-TURNEY RADIATOR CO.
ROME, NEW YORK



In this special type of transmission as installed in the F. W. D. one and one-half, three and five ton trucks -:- -:-

NEW DEPARTURE BALL BEARINGS

American Made for American Trade

are used exclusively

Many of these vehicles are now serving at the Mexican border fitted up as traveling workshops, water tank wagons and for hauling supplies.

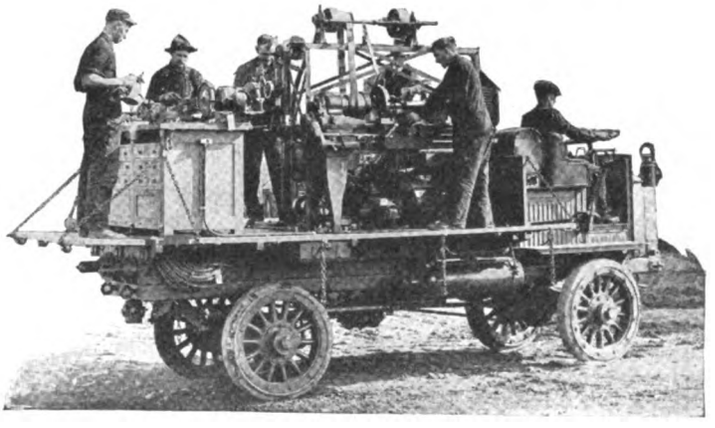
Under the exceptionally severe conditions of operation, to which the ten New Departures are thus put in this transmission, they have never failed in promoting maximum efficiency of the unit in which they are installed. and they have also proven a mighty factor in the dependable service of these trucks as a whole.

THE NEW DEPARTURE MFG. CO.

BRISTOL, CONN., U. S. A.

Conrad Patent Licensee

Western Branch: 818-20 Ford Bldg., Detroit
Distributors in Trade Centers throughout the United States
Sole British Agents: Brown Bros., Ltd., London and Manchester
For Continental Europe: Jacob Holst, Copenhagen, Denmark.



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Mack TRUCKS

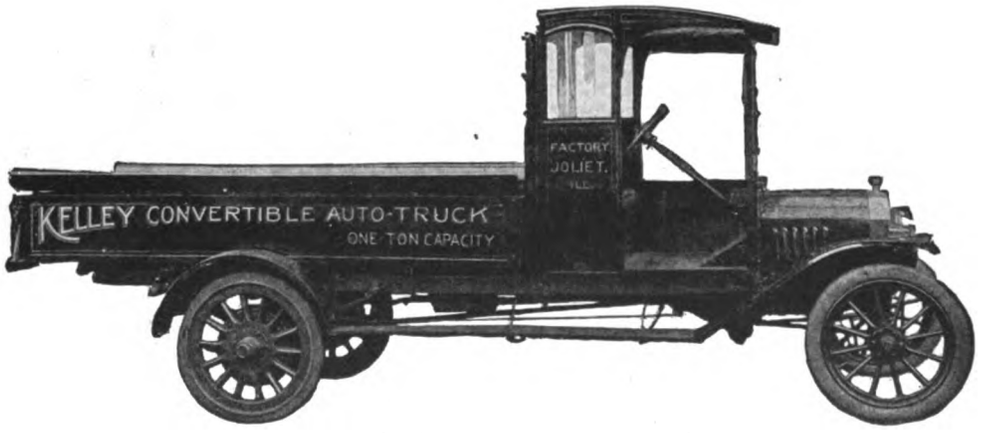
A FLEET of MACK heavy duty, long distance, express trucks drawn up in front of destination after making an overland trip from New York to Hartford.

MACK trucks give the man requiring transportation, the fullest measure of reliability, power and uninterrupted service. MACK trucks are constructed to stand the severest tests of time and usage, and years of experience prove that they give the lowest cost per ton mile under the most severe conditions.

Complete line—1, 1½, 2, 3½, 5, 5½, 6½, 7½ tons.
Tractor trailers 5 to 15 tons.

INTERNATIONAL MOTOR COMPANY
NEW YORK

A LIVE SELLING PROPOSITION



Kelley Convertible Truck Attachment

FOR A FORD CAR

In this construction the entire rear system of the Ford is discarded. The replacement carries 85 to 90 per cent of the load.

Cost of Attachment—internal gear..... $365
Total cost of Truck, including Ford, need not exceed.... $700

Not Cheapness, but High Quality at Low Cost. ***Sold under a Guarantee***

Good territory. Satisfactory discounts. Write or wire for details to

Kelley Convertible Auto Truck Co., 332 S. Michigan Ave., Chicago, Ill.
FACTORY: JOLIET

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Tires that stand the severest tests

—Wilson & Co., enterprising Chicago packers, proved their ability to maintain an efficient inter-city delivery system, as result of a test run between Chicago and New York.

—This 2-ton Autocar selected to carry Majestic hams to the mayors of 31 cities enroute, was equipped complete with

GOODRICH TRUCK TIRES

—The fronts were Regulars, the rears of the De Luxe "higher tread" type. All conditions of roads were encountered, yet the tires on reaching New York, October 22, scarcely showed a scratch.

GOODRICH TIRES are *dependable* tires in every form of service



Write for catalog

The B. F. Goodrich Company, Akron, Ohio

Makers of the Celebrated Goodrich Automobile Tires—*"Best in the Long Run"*

Service Stations and Branches in All Important Trucking Centers

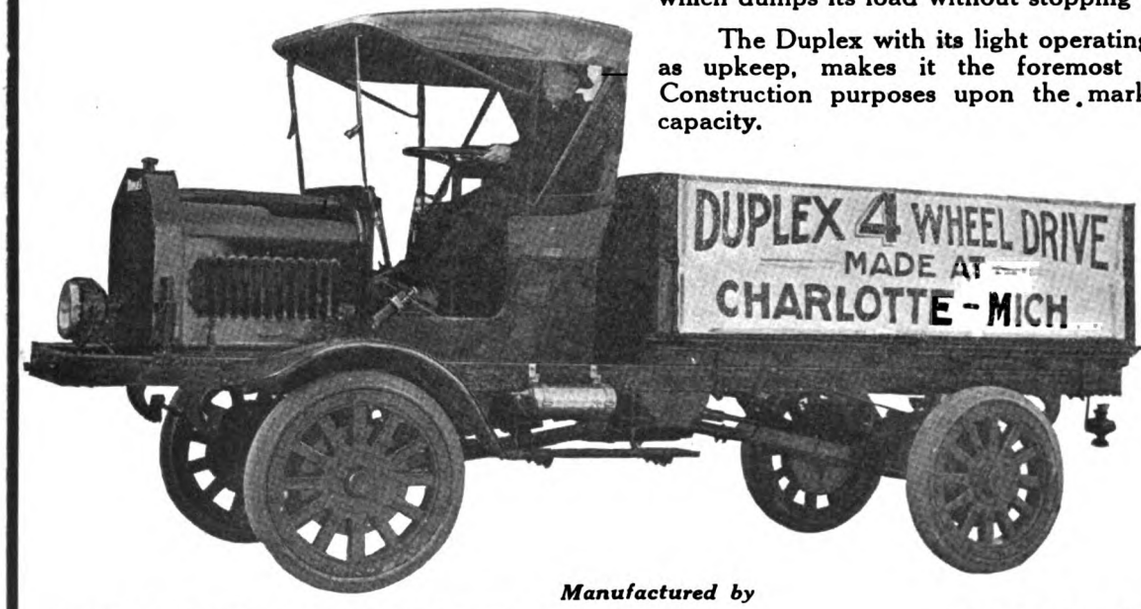
DUPLEX 4 WHEEL DRIVE

THE TRUCK OF EARNING EFFICIENCY

This cut represents the Duplex 4-Wheel Drive Road Truck, and is one of many others hauling one hundred and fourteen yards of gravel every twenty-four hours, a distance of 7.7 miles and at $1.00 per yard, earns $114.00 per day.

This truck with trailer has Duplex Side Dump Body which dumps its load without stopping the truck.

The Duplex with its light operating expense as well as upkeep, makes it the foremost truck for Road Construction purposes upon the market regardless of capacity.

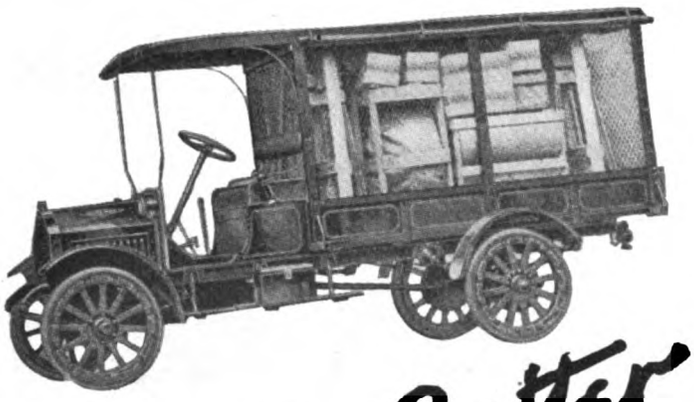


Made in two-and three-ton capacity

Manufactured by

DUPLEX POWER CAR CO., Charlotte, Mich.

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A Better Truck is not for Sale!

WHEN the enthusiastic representative of a motor truck manufacturer tells you that his line is better than the Bessemer, well, he's mistaken!

A better truck is not for sale. Money can't buy higher quality than is built into

THE BESSEMER LINE

With component parts made by the acknowledged leaders of the truck industry, our experienced designers have conceived and caused to be built a rugged, dependable truck, simple in construction, powerful, economical in first cost and operating expense and efficient in service even when driven by unskilled or careless drivers.

For Contractors and Merchants

these trucks offer the means of lowest cost transportation. They are light without having strength sacrificed, strong without being clumsy, simple without economizing on essentials.
At their respective prices our various models offer the fullest values for like capacities. We are more than ready to enter at any time, in any place, for any service, a series of competitive tests and to accept the verdict of the unbiased prospective purchaser.

One-Ton	Two-Ton	Three-and-One-Half-Ton
Internal Gear Shaft Drive	Worm Drive	Worm Drive
$1095 or	$2200	$3100
1075 Chassis only		

DEALERS—Write us NOW for our liberal selling plans. We give interested factory co-operation and enterprising aid to our dealers.

All inquiries regarding territory in New England, Eastern New York, Eastern Pennsylvania, New Jersey, Delaware, Maryland, Virginia and District of Columbia should be addressed to our Eastern distributors:

Bessemer Motor Truck Corporation

Lexington Avenue and E. 42nd Street NEW YORK CITY

All other inquiries to

BESSEMER MOTOR TRUCK COMPANY : GROVE CITY, PA.

BESSEMER

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THE big business on Brake Lining Renewals comes easily to the dealer who recommends GARCO on every job.

GARCO is built to back your good workmanship. It is a firm foundation on which to build a reputation for quality work.

Cheap Brake Linings are like cheap shoes. They look good on the surface, but in the grind of steady service they are bound to be found wanting.

For Safety's sake recommend GARCO. When your customer leaves the choice of brake lining up to you; USE GARCO. Clinch his future business along this line for all time.

THE GARCO line of Asbestos Automobile Specialties is complete. Write for prices on special type lining for Ford Transmission Bands.

All Jobbers sell GARCO Asbestos Brake Lining. Write yours today—let him give you our plan of dealer co-operation.

GENERAL ASBESTOS & RUBBER CO.

Main Offices and Factories, CHARLESTON, S. C.

Branches at: 58 Warren Street, New York. 312 First Avenue, Pittsburgh, Pa. 312 Golden Gate Avenue, San Francisco

PLEASE MENTION THE COMMERCIAL VEHICLE WHEN WRITING TO ADVERTISERS

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FULLER TRANSMISSIONS

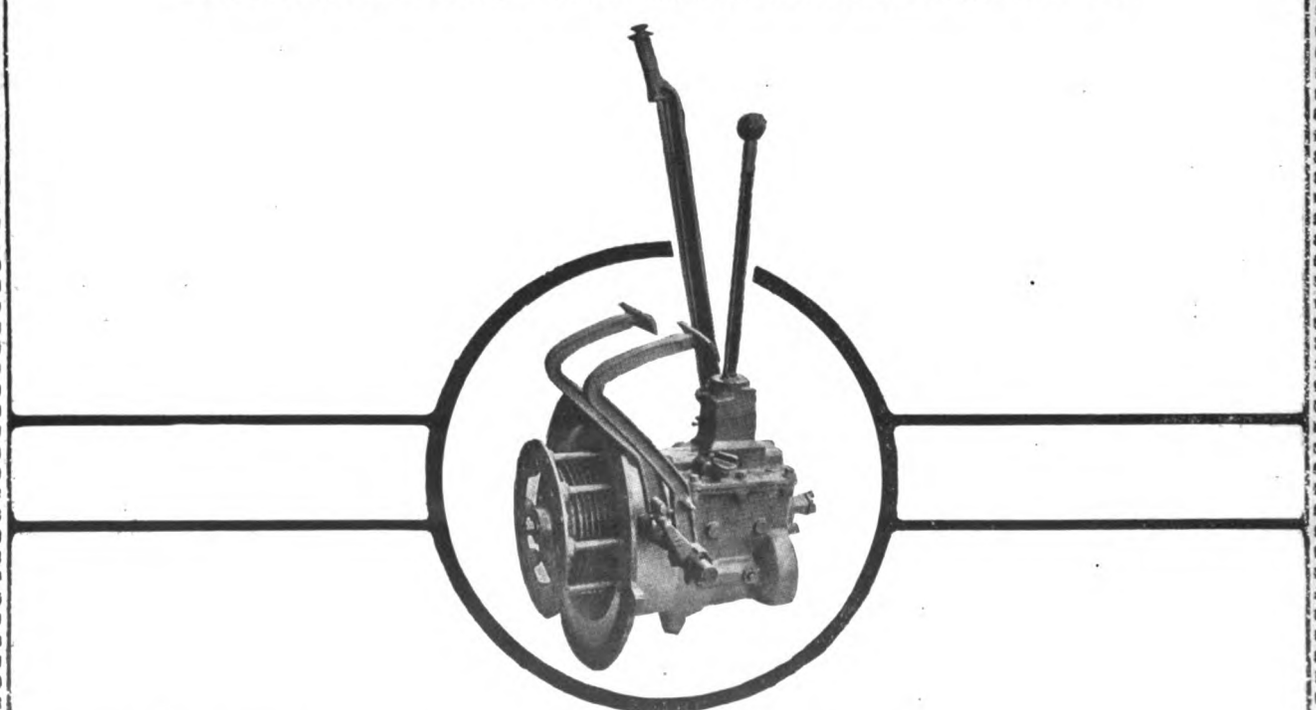
The many and varied stresses to which Transmission Members are subjected hour by hour, in motor truck service, will rack and utterly destroy gears, bearings and shafts, unless these parts are accurately made of known material.

FULLER TRANSMISSIONS

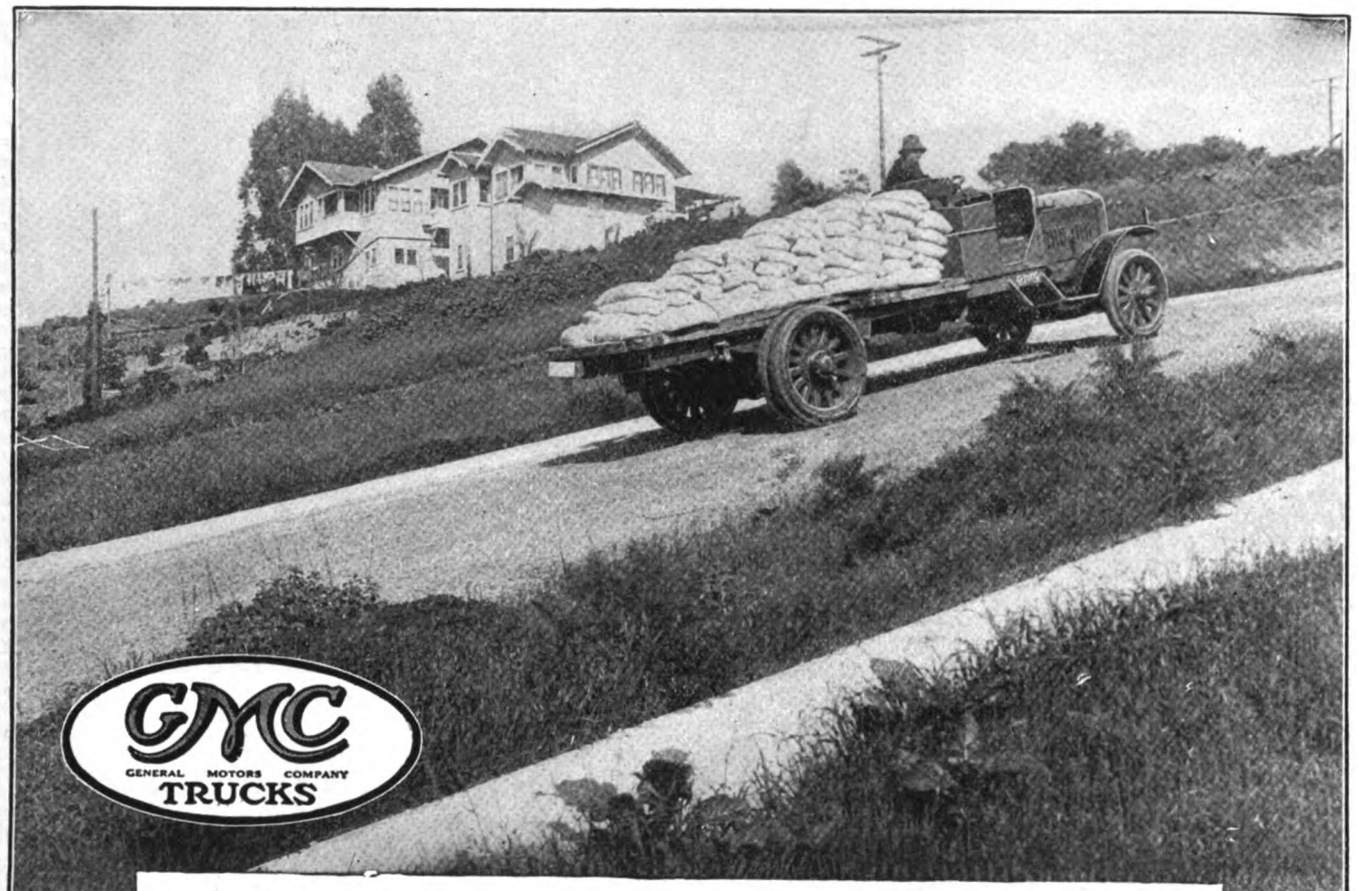
Contain only that material which has been subjected to rigid tests by skilled metallurgists and which is then machined by experienced mechanics under the relentless inspection which detects the slightest variation from the standards to which our product is made.

Fuller & Sons Mfg. Company, Kalamazoo, Mich.

Eastern Representatives, Earle & Boggs, Inc., 1790 Broadway, N. Y. City



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Greater Pulling Power—Lower Upkeep—Greater All'Round Dependability—That's the GMC Story

Truck buyers everywhere have learned by experience that from the standpoint of performance, low upkeep and low operating cost, GMC Trucks hold the record.

They have come to value the consistent, dependable service GMC Trucks render, and to appreciate the value of their simple, sturdy practical construction and the accessibility of all GMC parts.

Nowadays when new trucks are to be purchased to replace ones that have done service, or when the fleet is to be increased, the logical thing to do is to see the nearest GMC dealer.

And the GMC dealer, having a complete line ranging in size from ¾ to 5-ton carrying capacity, is prepared to answer the demand with trucks of the proper size and type—trucks that will render profitable, satisfactory service.

GMC dealers everywhere are participating in this increased demand for GMC Trucks and are building up a sound, profitable business.

There are still a few open territories. If you are thinking of taking on a line of trucks, we suggest that you communicate with TRUCK HEADQUARTERS and learn of our dealer proposition.

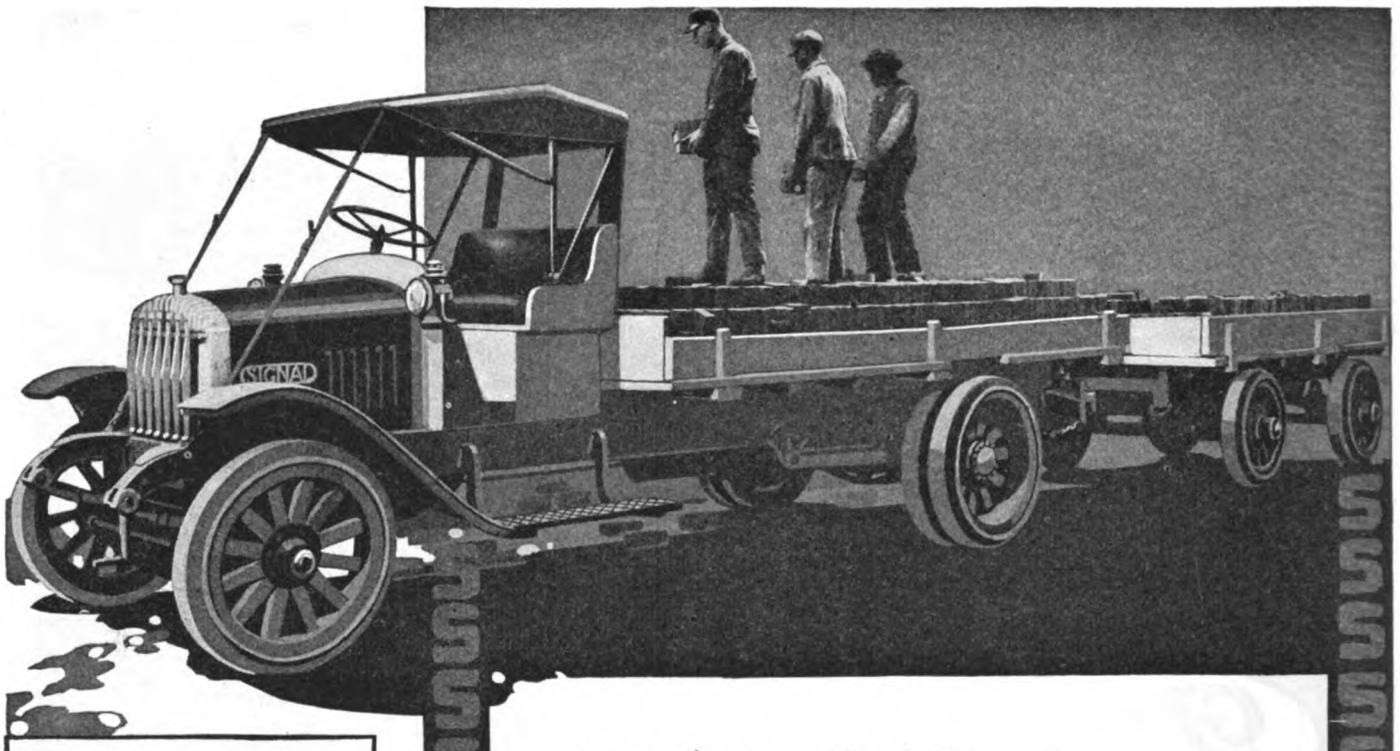
GENERAL MOTORS TRUCK COMPANY

One of the Units of the General Motors Company

PONTIAC, MICHIGAN (123

Direct Factory Branches: *New York, Boston, Chicago, Philadelphia, St. Louis*

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SIGNAL
1-1½-2-3½&5 TON

Dealers

The Signal idea is to put the Service in the truck, where it belongs.

If this idea appeals our proposition will interest you immensely.

Worm drive only. 1½ tons to 5 tons.

"On the Job"—Always

A Motor Truck is like a man. You invest in it for what it *does* rather than for what it *is*.

And big business says there is no better man-quality than the ability to be always "on the job."

For precisely the same reason that a man is profitable for what he *does* rather than for what he *is* a motor truck pays a profit only when it is persistently and consistently "on the job."

It is because we deem the ability to be "always on the job" the most important asset a truck *can* have that we emphasize it in Signal *construction* even more strongly than in Signal advertising.

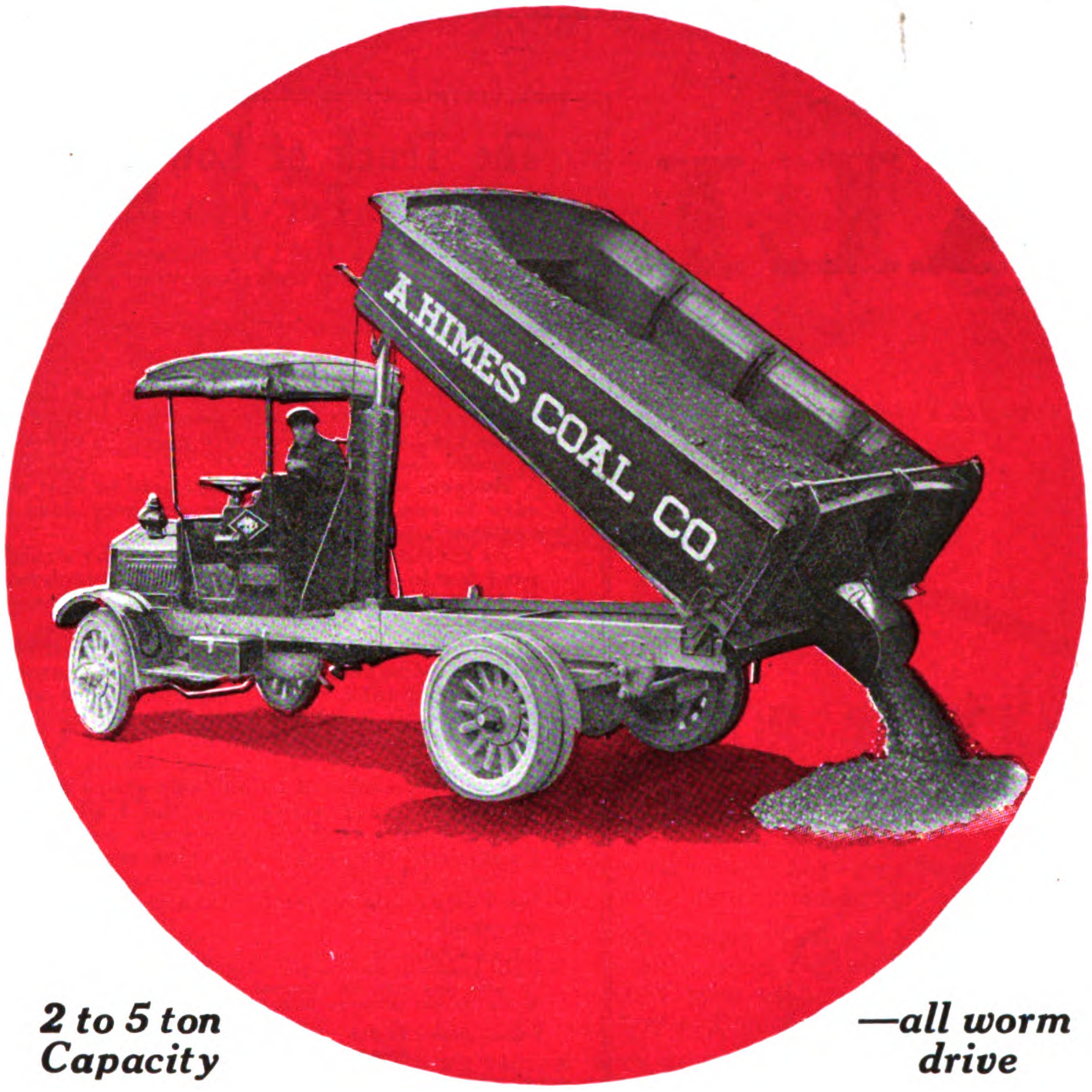
It would be extremely foolish to put it in the advertising and leave it out of the construction. That is why Signal employs such units as Continental Motor, Timken-David Brown axles, Brown-Lipe transmissions, and Detroit Self-Lubricating Springs.

If the Signal idea appeals to you as a truck buyer or dealer get in touch with us at once.

Signal Motor Truck Co.

DETROIT, MICHIGAN

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2 to 5 ton Capacity

—all worm drive

For Every Type of Service

Every day United Trucks are setting new records of achievement in heavy duty hauling. Their tremendous power, gigantic strength and faithful endurance are factors of prime importance on **big jobs** where time means money.

In general freight—in contracting work—in hauling coal, brick, ice, cement, sand, gravel and every service where it is necessary to move **big loads** in **quick time,** United Trucks are dividend paying investments.

Dealers who have the good fortune to handle United Trucks soon learn that they have the features that make them easy to sell—and they stay sold. Every mechanical unit well known by name, reputation and practical experience. Standardized to the minute.

We have an interesting proposition for dealers who are awake to the possibilities of the big, growing heavy duty field. Write us today for details and complete specifications.

UNITED MOTORS CO., 672 North St., Grand Rapids, Mich.

All Worm Drive

United Trucks

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HALL

The Truck of Lowest Final Cost Per Ton Mile

"Haul it in a Hall" has become the settled answer to all heavy traffic questions put to Hall owners.

They are the most enthusiastic truck owners on Earth.

Why?

Because the HALL TRUCK is **there** in big emergencies when a little more weight has **got** to be carried at a little more speed in order to save the day.

Rugged, strong, roadworthy, hard to hurt and easy to run, the Hall Truck not only does its work well, but at less cost.

Its consistent speed—not only on the straight road, but in crowds, round corners, through mud and sand—cuts down haulage costs tremendously.

Equipped also with the fastest and most economical dumping device known (Improved Wood Hydraulic Hoist), the HALL has absolutely proved its ultimate economy on the basis of lowest final cost per ton mile.

Combined with the rugged chassis frame, forged and machined in our own shops by iron workers of long experience, the Hall carries standard units of the highest class, such as the Continental Motor, Timken axles, etc.

For any heavy duty purpose you cannot beat the HALL, and for extraordinary service it has no equal.

DEALERS:—We stand ready to give you not only every other sales-help and backing, but have definitely arranged to help you sell on deferred payments when necessary. Write for our generous terms.

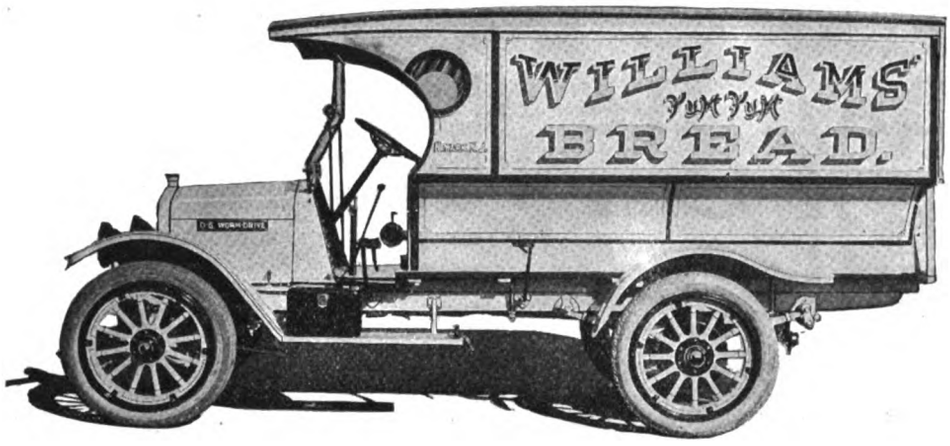
2-ton, chain, $2,000 ***3½-ton, chain or worm, $2,800***
5-ton, chain or worm, $3,600

LEWIS HALL IRON WORKS
Manufacturers of the Hall Truck
(Established 1873)
Ferry Ave. & Grand Trunk Ry., Detroit, Mich.

THE Hall TRUCK



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¾ - ton Worm - Drive chassis, $975.00. Electric lights and Self-starter, $85.00 additional. Pneumatic tires, regular equipment. Solid or cushion tires optional at slight additional cost.

D-E WORM-DRIVE MOTOR TRUCKS

¾-Ton $975 1-Ton $1500 1½-Ton $1800

THERE is not a better line of light delivery trucks built anywhere by anybody. When trucks can be made any better, we will make them better.

Continental and Le Roi motors, Sheldon worm-drive rear axles, and Sheldon front axles and springs, Parish frames, Gemmer steering gears, Detroit G & M transmissions and clutches, Jones wheels, Stewart-Warner vacuum systems, speedometers and horns, and so on. Only the very best and most expensive units.

We have a splendid lot of dealers, but our 1917 production will allow us to take on several more, and still be able to give every dealer his trucks just when he promises his customer he can make delivery. This is a pretty important point, Mr. Dealer.

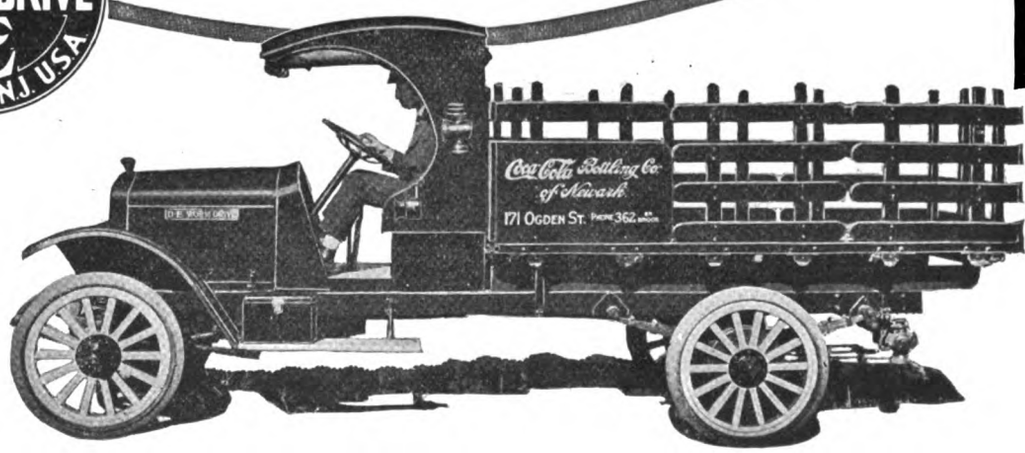
You don't have to carry the trucks on your floor—we carry them. You don't have to carry your time payment sales—we finance those for you. In a word, we make it very easy and profitable for you to become a seller of D-E WORM-DRIVE MOTOR TRUCKS, and the trucks sell themselves.

Telephone, telegraph, wire or call for complete specifications, dealer's discount, and further information.

DAY-ELDER MOTORS CO.

NEWARK, N. J.

DAY-ELDER MOTORS CO. D WORM-DRIVE E NEWARK N.J. U.S.A.



1 - ton Worm - Drive chassis, $1500.00. Solid tires, regular equipment. Pneumatic or cushion tires, optional, at slight additional cost.

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What Can Be Left Out of Our Specifications?

In considering what your suggestion will be as to the price we should charge for these exceptional trucks, read over the specifications carefully and see if you find among them something that might be omitted.

PALMER

SERV
DEPEND
TRU

Don't Forget That We Want to Hear from *You*, Too!

Many responses are coming in daily to our request that dealers read the specifications on the opposite page and let us know their opinions as to the proper prices for these two new Palmer-Moore models.

Have we heard from **you?**

There is need for prompt action on this, for we want all dealers selected by us to be "all set," properly supplied with trucks ready to meet the demand when the time comes.

That time (January 1st) is rapidly approaching —and there is going to be **some** demand.

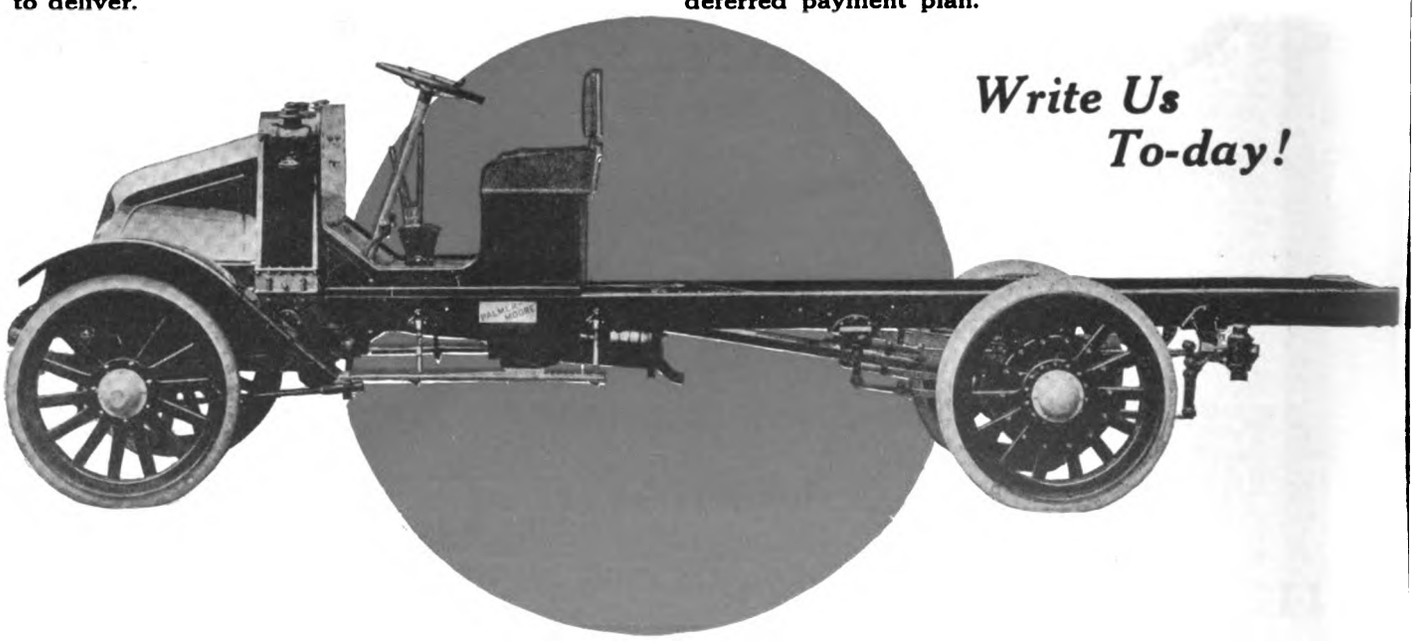
Everything points to a business that is going to keep dealers busy from the very start, and we want you to be there with the goods, ready to deliver.

So don't get anchored on this—read the specifications—see if there is anything you could leave out of them and still retain the rounded-out completeness, the real cost-cutting, service-giving truck value that these models contain.

Then write and tell us about it. Give us your ideas on this and also as to the proper prices to charge.

Do it now—January 1st is near at hand—and on that date the price finally decided upon will be published.

As a Palmer-Moore Dealer you will not only have these splendid trucks to sell, but we will back you up with the strongest sort of sales helps, including the financing of sales made on the deferred payment plan.

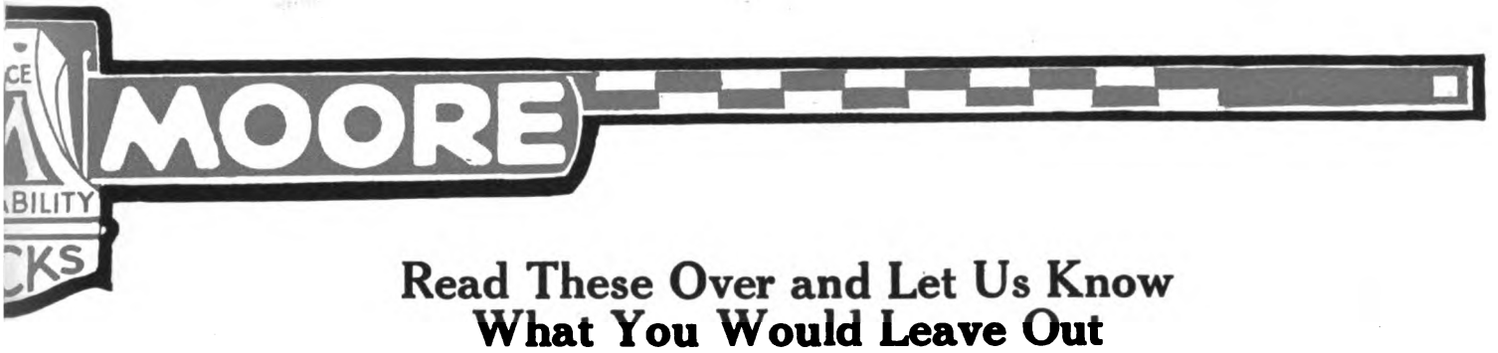


Write Us To-day!

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Is there anything we could leave out and still retain the same Strength and Efficiency, the same low-cost-per-ton-mile delivery attributes that now are characteristic of Palmer-Moore Trucks?

Do you think so?



Read These Over and Let Us Know What You Would Leave Out

(SPECIFICATIONS)

MODEL M—1 TON CAPACITY

MOTOR—Buda. 3½" bore by 5½" stroke, 4 cylinder L Head cast enbloc. Enclosed valve mechanism. Valves interchangeable, stems hardened, 1⅛" working diameter, removable bushings. Three bearing crank shaft, balanced. Pistons, connecting rods and all reciprocating parts balanced. All moving parts easily accessible. Constant level oiling system, positive pump. Oil supply 7 quarts capacity. Thermo-syphon cooling. Main and connecting rod bearings, bronze shell, nickel babbitt. Cam-shaft bearings phosphor bronze. High tension magneto with special automatic spark advance. Zenith carburetor. Three-point suspension.

RADIATOR—Dash-board type. Seamless helical tubes. Top and bottom sections cast, bolted to cooling sections. **Cooling sections interchangeable.** Spring mounted.

CONTROL—Left-hand steer. Center control gear shift and emergency levers. Foot pedals for clutch and service brakes. One lever only (for throttle) on steering wheel. Spark control automatic.

DRIVE—Straight line through four universal joints (two ahead of transmission) and 2¼" tubular shaft to internal gear rear axle.

GEAR RATIO—Direct on high, 7.1 to 1. Second 10.6 to 1. Low 18.9 to 1. Reverse 26.2 to 1.

ROAD SPEED—20 miles per hour at 1400 motor R.P.M.

CLUTCH—Borg & Beck. 10" multiple disc.

TRANSMISSION—Covert. Selective type. Three forward speeds, one reverse. All gears nickel steel, ⅞" face. Hyatt roller bearings.

FRONT AXLE—Sheldon. "I" beam section, spindles 1 37/64" by 1⅜". Bower roller bearings.

REAR AXLE—Torbensen internal gear. A dead axle carries the load and takes all road shocks. The live axle and the internal gears, located in the rear wheels, transmit the power and have to stand transmission strains only. Bower roller bearings.

BRAKES—Service 15" x 2½", external contracting on rear wheels. Emergency 14⅝" x 2½", internal expanding on rear wheels. Both have extra length equalizer bars.

FRAME—Parish and Bingham. 3/16" pressed steel, channel section, 38" wide and inswept to 33½" between front wheels. 4½" deep, 3" wide at offset, 180" long. Cross members and corners gusseted and hot riveted.

SPRINGS—Semi-elliptic. Front 38" x 2", 8 leaves. Rear 50" x 2", 8 leaves. Front hanger of rear spring designed to take driving thrust and prevent breakage of spring eye. Adjustable to relieve pressure and wear on spring bolt. Rear spring design includes a straight underslung spring to prevent rear end jumping up, also to act as auxiliary spring under excess loads. **Both front and rear springs designed with special non-slip feature.** All spring bolts have grease cups.

WHEELS—Artillery type. 14 1¾" square spokes, front and rear.

TIRES—Motor truck type. Front 34" x 3", rear 34" x 4".

STEERING GEAR—Ross, worm and nut type. 18" hand wheel.

WHEEL BASE—126". Tread 56".

FUEL TANK—Pressed steel, 16 gallons capacity.

STANDARD BODIES—Open express and stake.

LOADING SPACE—Standard; 9 feet long by 46" wide back of driver's seat. Height of floor 34" from ground.

STANDARD COLORS—Chassis, red. Body, Richelieu blue.

EQUIPMENT—Running boards, front and rear mudguards. Oil side and tail lamps. Complete set of tools in kit. Horn.

MODEL O—2 TON CAPACITY

MOTOR—Buda. 4⅛" bore by 5½" stroke. 4 cylinder L Head cast enbloc. Enclosed valve mechanism. Valves interchangeable, stems hardened, 1⅛" working diameter, removable bushings. Three bearing crank shaft, balanced. Pistons, connecting rods and all reciprocating parts balanced. All moving parts easily accessible. Constant level oiling system, positive pump. Oil supply 8 quarts capacity. Pump cooling. Main and connecting rod bearings, bronze shell, nickel babbitt. Cam-shaft bearings phosphor bronze. High tension magneto with special automatic spark advance. Zenith carburetor. Monarch governor. Three-point suspension.

RADIATOR—Dash-board type. Seamless helical tubes. Top and bottom sections cast, bolted to cooling sections. **Cooling sections interchangeable.** Spring mounted.

CONTROL—Left-hand steer. Center control gear shift and emergency levers. Foot pedals for clutch and service brakes. One lever only (for throttle) on steering wheel. Spark control automatic.

DRIVE—Straight line through four universal joints (two ahead of transmission) and 2½" tubular shaft to internal gear rear axle.

GEAR RATIO—Direct on high 8 to 1. Second 12.8 to 1. Low 26.4 to 1. Reverse 34.4 to 1.

ROAD SPEED—15 miles per hour at 1175 motor R.P.M.

CLUTCH—Borg & Beck. 12" multiple disc.

TRANSMISSION—Covert. Selective type. Three forward speeds, one reverse. All gears nickel steel, 1¼" face. Hyatt roller bearings.

FRONT AXLE—Sheldon. "I" beam section, spindles 1 31/32" by 1¾". Bower roller bearings. Steering knuckle has ball thrust bearing.

REAR AXLE—Torbensen internal gear. A dead axle carries the load and takes all road shocks. The live axle and the internal gears, located in the rear wheels, transmit the power and have to stand transmission strains only. Bower roller bearings.

BRAKES—Service 18" x 2½", external contracting on rear wheels. Emergency 17½" x 2¼", internal expanding on rear wheels. Both have extra length equalizer bars.

FRAME—Parish and Bingham. 7/32" pressed steel, channel section, 38" wide and inswept to 34¾" between front wheels. 5 9/16" deep by 3" wide at offset, 212" long. Cross members and corners gusseted and hot riveted.

SPRINGS—Semi-elliptic. Front 40" x 2½", 9 leaves. Rear 50" x 2½", 11 leaves. Front hanger of rear spring designed to take driving thrust and prevent breakage of spring eye. Adjustable to relieve pressure and wear on spring bolt. Rear spring design includes a straight underslung spring to prevent rear end jumping up, also to act as auxiliary spring under excess loads. **Both front and rear springs designed with special non-slip feature.** All spring bolts have grease cups.

WHEELS—Artillery type. 14 2" square spokes, front and rear.

TIRES—Motor truck type. Front 34" x 4", rear 34" x 6" single.

STEERING GEAR—Ross. Worm and nut type. 18" hand wheel.

WHEEL BASE—140" or 160". Tread 56".

FUEL TANK—Pressed steel, 16 gallons capacity.

LOADING SPACE—Standard length of frame back of driver's seat, 10'1" x 38". Height of frame from ground 38½".

STANDARD COLORS—Chassis, red.

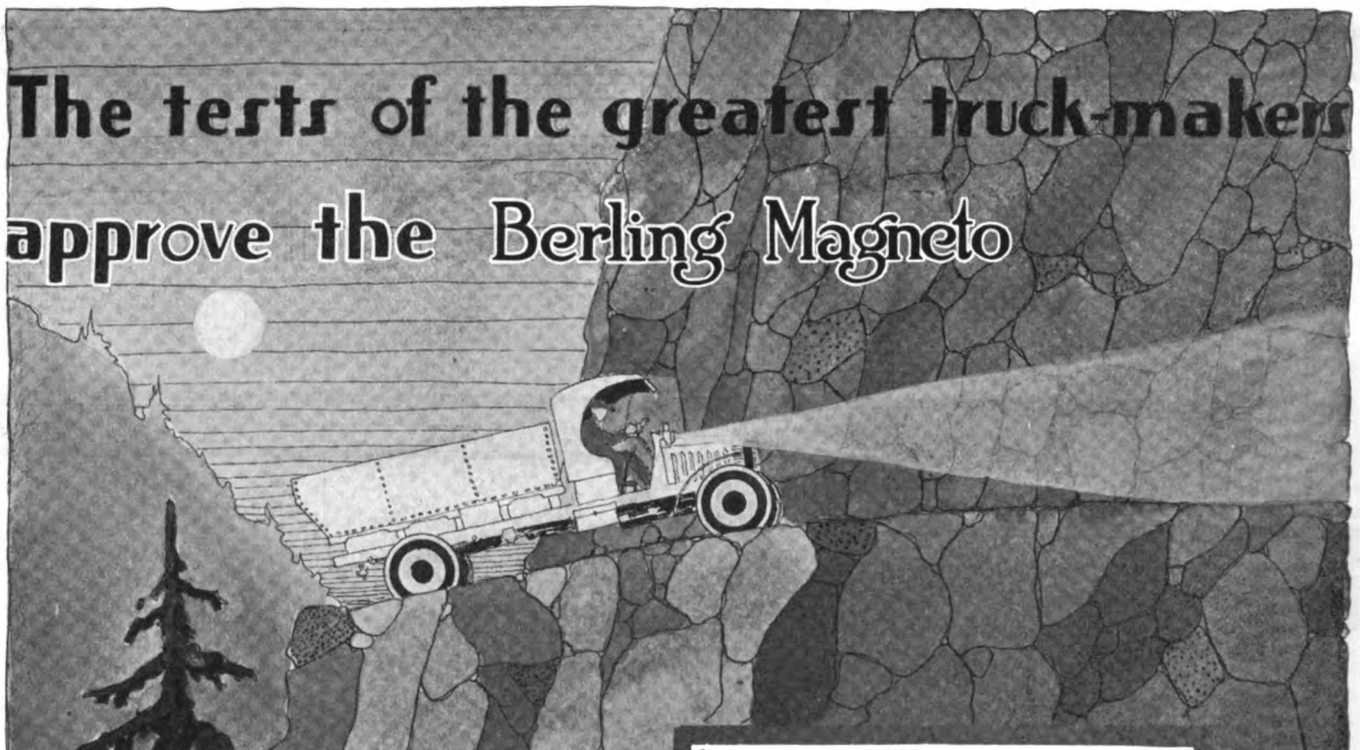
EQUIPMENT—Running boards, front mudguards. Oil side and tail lamps. Complete set of tools in kit. Horn.

PALMER-MOORE COMPANY

110 N. Geddes Street Syracuse, N. Y.

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The tests of the greatest truck-makers approve the Berling Magneto

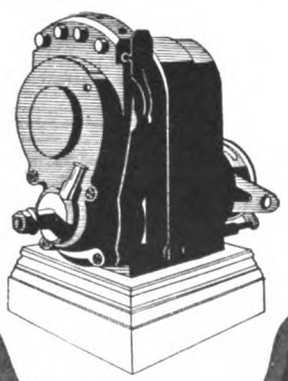


AT the present writing, three of the world's five greatest motor-truck makers are completing exhaustive tests of the Berling magneto—tests which so far have justified the claim—"worth more—does more".

Two of the best-known motor manufacturers last year used the Berling as "optional" equipment. This year they have adopted the Berling as "standard" equipment.

Merit wins—that is why the Berling is striding ahead so fast.

Ericsson Mfg. Co.
1186 Military Road
Buffalo, N. Y., U. S. A.



Worth More Does More

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America's Greatest Truck Men Have Asked for Our Sales Plan

THE new Gramm-Bernstein Sales Plan is the biggest thing in the truck field today. So big in every feature that a number of the leading truck dealers in the country have already become Gramm-Bernstein men. They knew the marvelous "stand up" quality of the Gramm-Bernstein Truck. They knew the Gramm-Bernstein reputation of fifteen successful years and they also knew that truck buyers realized the money-saving and efficient, dependable service value of the Gramm-Bernstein Truck.

A Gramm-Bernstein Truck Salesman Helps Close Big Deals

One of our expert salesmen on the job with you to help when the deal is large or particularly difficult. That's the kind of Gramm-Bernstein service that makes sales, the kind that means bigger profits to you. It gets you started quickly. You can "get action" at once and soon be making pace for much older competitors.

Advertise Gramm-Bernstein Trucks In Your Own Town at Our Expense

Gramm-Bernstein advertising goes where your customers will see it. Brings immediate results. Placed in your own home papers over your name. Backed by the famous Gramm-Bernstein Trucks, it can't be beaten. We reach the truck prospects in your community—the men who should buy of you—through the medium that means most to them, their own city daily paper. It's part of the big dealer service we back Gramm-Bernstein dealers with.

Don't Lose Through Delay—Write Us Today

All we ask of you is to get our plan. We want to show you in black and white the biggest sales-making policy ever offered. We want you to know the strength and stability of the Gramm-Bernstein Co. Gramm-Bernstein Trucks—America's pioneer line—is backed by fifteen years of successful manufacture. It's the line you want to know more about. ***Write or wire*** us today. Your wire will be safer. First applications get first consideration in your locality. ***Act!*** See what this Gramm-Bernstein offer means to you.

If you are the man we are after—here is your opportunity. Find out **now**

Gramm-Bernstein Motor Truck Company, Lima, Ohio, U.S.A.

Gramm-Bernstein Motor Truck Co. 13 Gramm Blvd., Lima, O., U.S.A.

Please send me complete explanation of your new sales policy on Gramm-Bernstein Trucks, including reasons why it will pay me to handle the line, the advertising you will do for me in my local papers, the Dealer Sales Service, etc.

Name_____

_____

Street and No._____

City_____ State_____

I [am / am not] representing a truck at the present time

If you are, please give the name of it here_____

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Fedders Quality Is Recognized

by those to whom high quality is an absolute necessity, namely the builders of our finest motor trucks.

The White Truck—the Packard Truck—the Knox Tractor—and many others—have used Fedders Radiators continuously for years—some of them ever since Fedders were first produced.

If this means anything, it means that Fedders Quality has met and passed the supreme test—has helped in all ways that a radiator can to lower haulage cost per ton mile.

It means that if your truck be Fedders-equipped you are as amply guarded against radiator trouble as it now lies within the power of man to guard you.

FEDDERS RADIATORS

FEDDERS MANUFACTURING CO.

BUFFALO NEW YORK

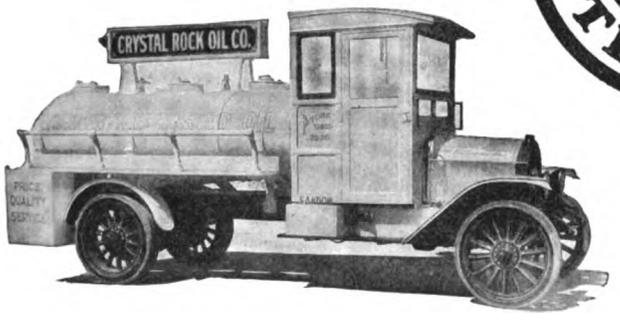
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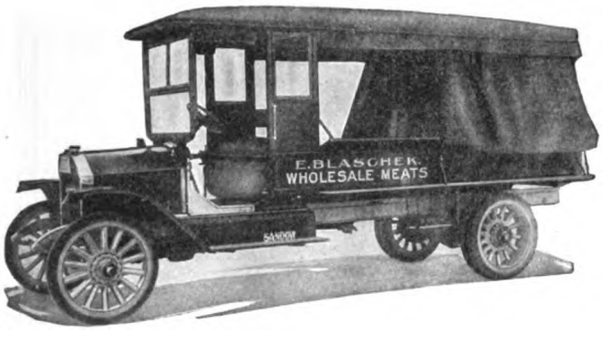
SANDOW

MOTOR SANDOW TRUCKS

DEALERS

Are you equipped to give the kind of service SANDOW Company demands? If you are, write or wire today.





THE BEST SERVICE STATION in every city in the United States now have an opportunity to secure an exceptional Service Contract.

To qualify it will be necessary to satisfy us you employ only first class mechanics with a thorough knowledge of motor truck business; that you are **equipped to promptly repair any job damaged by fire, collision or other accident, and, above all, that you have both night and day service with sufficient floor space to accommodate SANDOW owners without unnecessary delay.**

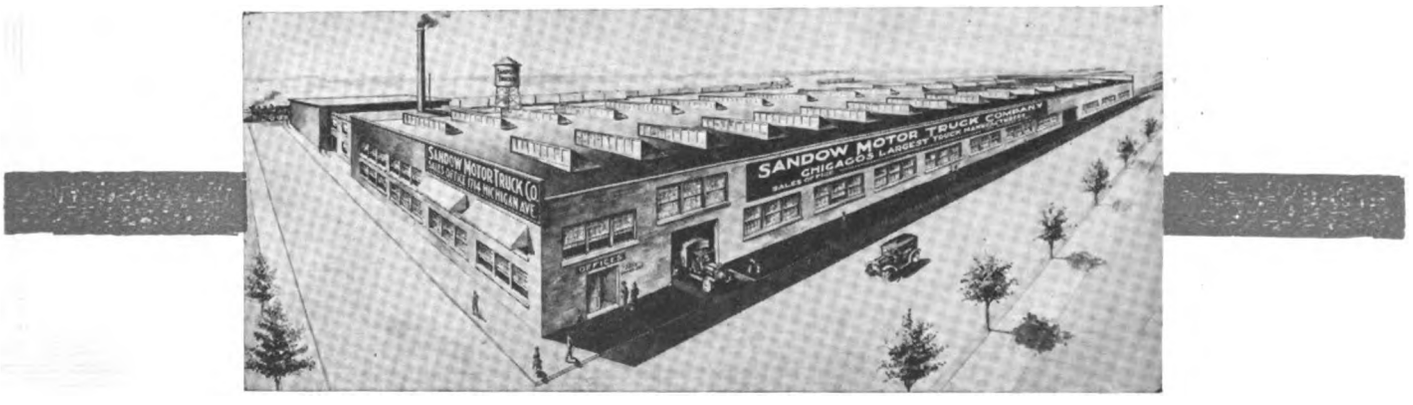
SANDOW dealers are merchandisers. They sell SANDOW Trucks on the basis of maximum net returns from minimum expenditure. SANDOW Trucks 1, 1½, 2, 3½ or 5 ton capacity—all designed for greatest profits in every business.

If you are equipped to handle SANDOW big business on the SANDOW basis, write or wire today.

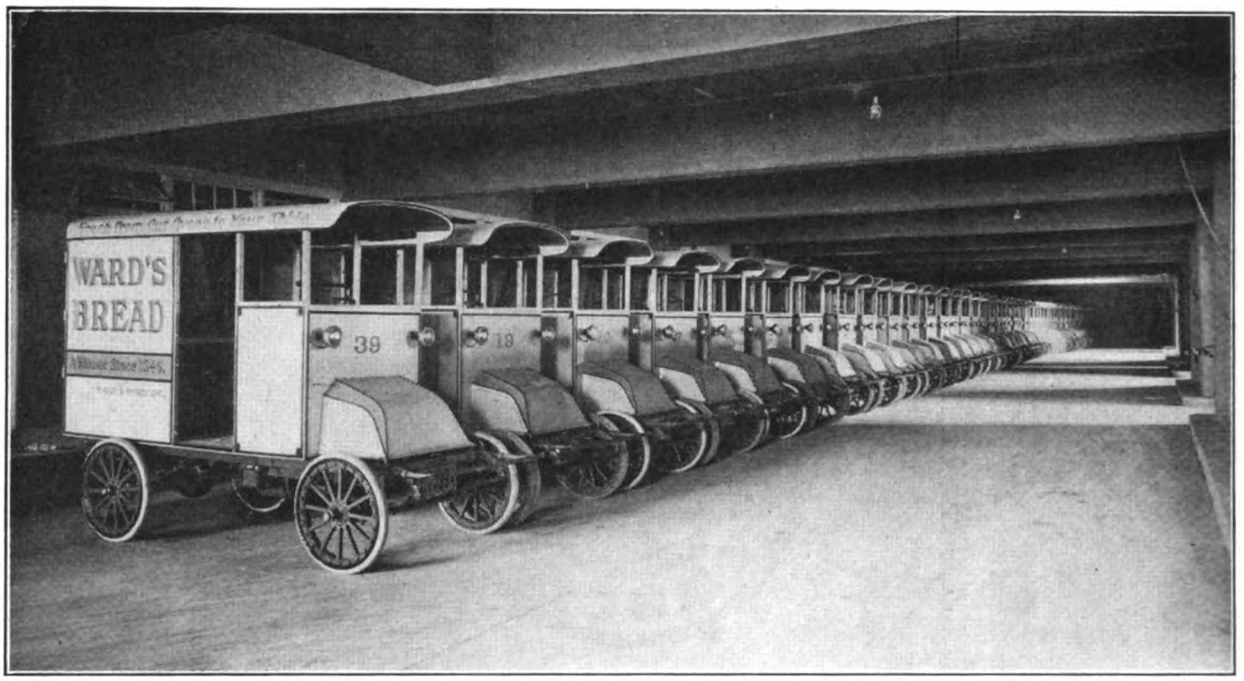
SANDOW MOTOR TRUCK CO.

General Sales Office, 1715 Michigan Ave., Chicago

Factory No. 1, 3300-3350 Grand Ave. **Factory No. 2, 2916-2924 W. Lake St.**



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Part of a fleet of 120 "Ward Specials" in the baking business in Buffalo.

There are Hundreds of "Ward Specials"

in the baking industry alone, in installations running from one to one hundred or more. Department stores, groceries, laundries, and other businesses with similar delivery requirements are rapidly swelling this host of users.

The Largest Truck Fleets in the Country

belong to companies whose success hinges upon reliable and economical delivery service, and in these fleets electric trucks predominate. The reason is obvious; the natural advantages of the electric insure this kind of service. The "Ward Special" offers these advantages at a price within the reach of every merchant.

The "Ward Special" Opens to the Dealer

a new field, rich with prospects and productive of many fleet orders. It enables him to build up a substantial business with profitable and steady returns and a minimum of service expense.

Some Very Attractive Territory

is still open to live dealers who wish to establish a permanent business of this kind. Factory co-operation, prompt deliveries, and satisfied customers, coupled with energetic solicitation, practically guarantee success.

Ward Motor Vehicle Company

Builders of Electric Trucks up to 5 Tons Capacity

Mt. Vernon **New York**

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J. W. WHITLOCK & CO
MANUFACTURERS OF
High Grade Dining Room Chairs
RISING SUN, IND

Sept. 11, 1916.

The United States Motor Truck Co,

Cincinnati, Ohio.

Gentlemen:

When I purchased my first U.S. Truck in May of the present year there was a doubt in my mind as to whether it would successfully do the work that I expected of it. I am happy to say that I am now thouroughly convinced that it is a most complete success.

As you know I operate a saw mill here in Rising Sun, and my timber is located ten miles away. The road is a fair macadam road and the truck which is your model "J" 3-1/2 Ton Worm Drive makes three round trips a day hauling about 600 feet of Green Oak logs on each trip. I figure that my truck is doing the work of five teams and wagons and will pay for itself within the year.

I have now driven the truck about three thousand miles and have had no trouble of any kind. The best evidence however, of my satisfaction is to tender you herewith my order for another U.S. Truck Model "J" 3-1/2 Ton duplicate of the one that I am at present operating.

Trusting that you can deliver this without delay, I remain with best wishes

Very truly yours

J. W. Whitlock.

These illustrations give rather strong evidence of the extreme efficiency of the worm drive under unusual conditions.

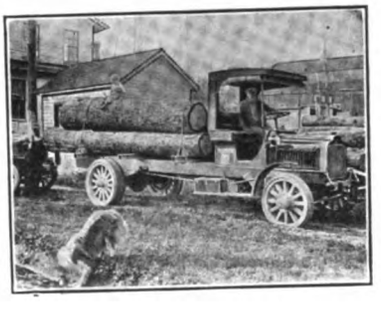
Mr. Whitlock's letter, in which he orders his second truck, tells better than an solicitation we might make of the capacity and all-around efficiency of his worm driven U. S. Motor Truck.

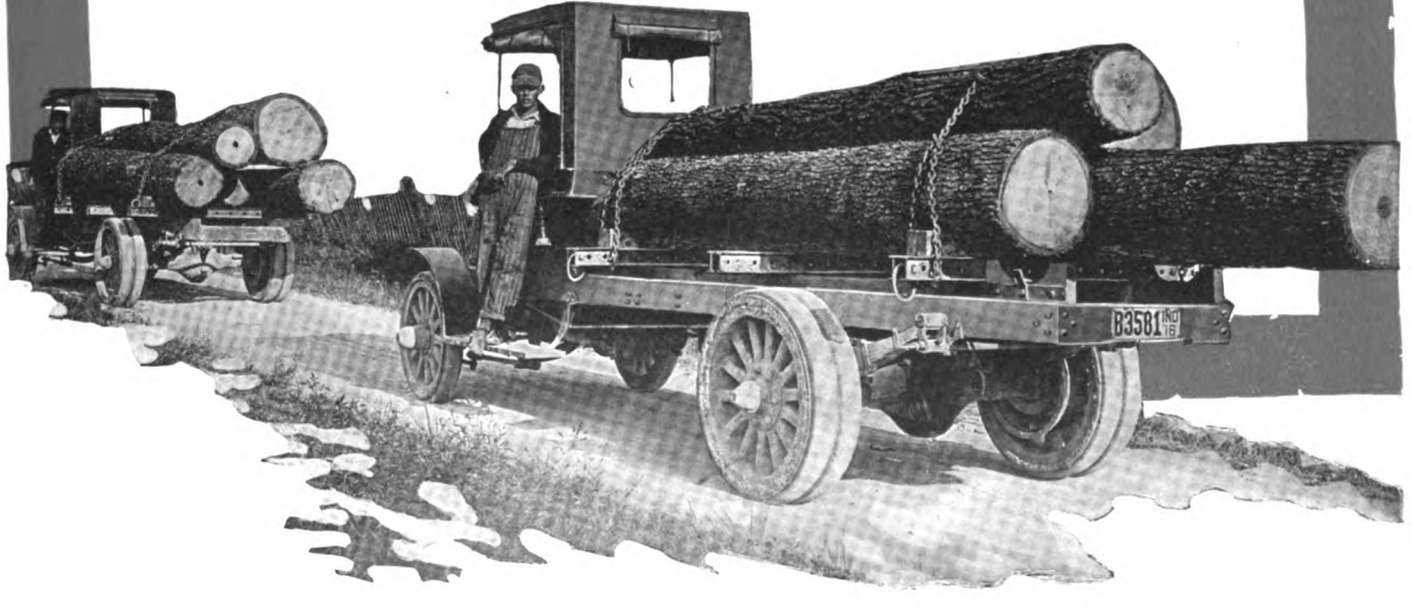
It is the continued similar performance of worm driven trucks, day in and day out, throughout the world, that has made the worm drive the dominant type for truck final drive, from the smallest to the largest capacity.

SHELDON AXLE & SPRING CO.
WILKES-BARRE **PENNA.**

SHELDON







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Your Neighborhood Business can be made city-wide with

Tonford

TRADE MARK

If a one-ton truck will do, a "Tonford" will do better.

—Trade Slogan

$325

F.O.B. DETROIT

MADE IN DETROIT USA

The "Tonford" truck unit, simply and quickly attached to **any** Ford chassis, old or new, gives you a one-ton capacity truck of proven reliability.

It will cut down delivery costs and increase your business.

Inadequate delivery service restricts your trade field. A "Tonford" will make the whole city your "neighbors." You can deliver anywhere quickly and carry a load far beyond the capacity of any truck or delivery car.

Cuts Delivery Cost

It is reducing delivery costs for merchants in every line of business—it will reduce them for you. Make us prove it.

The "Tonford" has Ford strength, Ford economy of operation and upkeep and Ford simplicity.

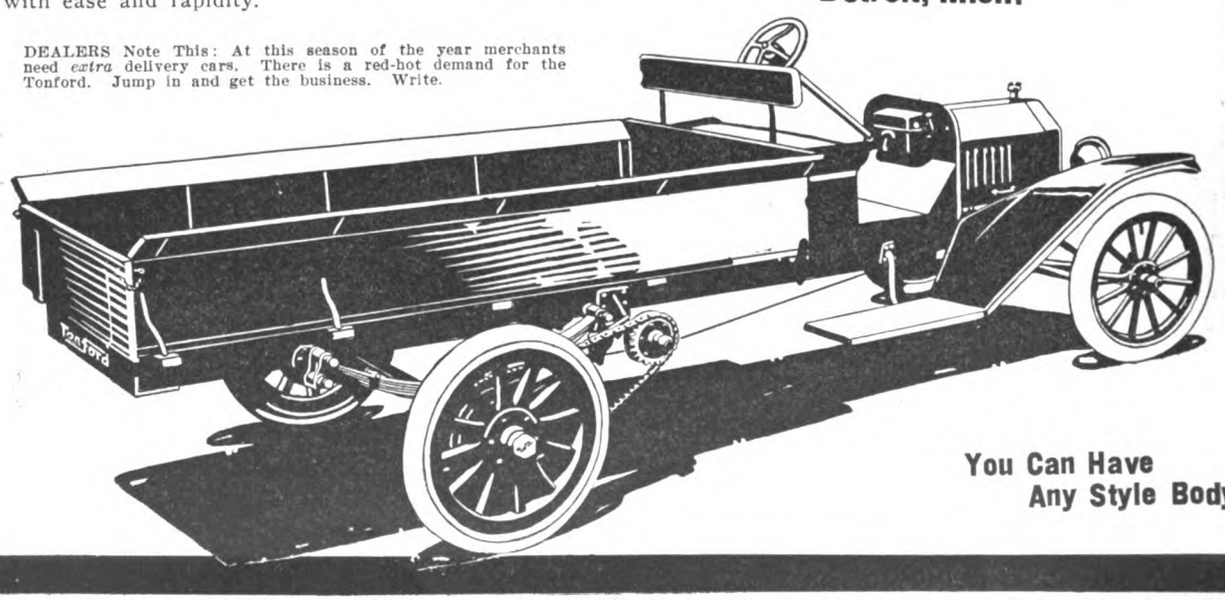
It handles easily—and carries the load up any hill with ease and rapidity.

Should you desire at any time to turn the car back to a pleasure vehicle, the "Tonford" truck unit can easily be detached.

Compare the "Tonford" with the best one-ton trucks in efficiency and economy, and then think of the Tonford price. We will risk your decision, for we know what the "Tonford" is, and what it will do. Write at once for name of nearest "Tonford" dealer.

DETROIT TRUCK CO.
Detroit, Mich.

DEALERS Note This: At this season of the year merchants need *extra* delivery cars. There is a red-hot demand for the Tonford. Jump in and get the business. Write.



You Can Have Any Style Body

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KisselKar Truck used by Ogden Packing & Provision Co., Ogden, Utah

KISSELKAR TRUCKS

The final choice of purchasing experts in over 200 different lines of business.

The matchless Kissel-built motor, and perfected worm drive rear axle are guaranteed with every KisselKar Truck.

Seven sizes from the 1500 lb. delivery up. Chassis prices $950 to $2850.

KisselKar Truck branches, display rooms and service stations in all principal cities and towns.

THERE is nothing lacking in the mechanical perfection of the KisselKar Truck.

In all lines of business its ease of operation, durability, resiliency—the tremendous power of its Kissel-built engine—insure delivering more goods in a shorter space of time and at a lower cost per mile per ton.

You, too, will find your KisselKar Truck 100% efficient in your haulage requirements. Built in a range of capacity sizes that insures the exact size for you.

Send for truck information and data on KisselKar Truck performance in your line of business.

Dealers—we have a few excellent openings to represent KisselKar Trucks. Write or wire us today.

KISSEL MOTOR CAR CO., Hartford, Wis.

Digitized by Google

"Not Laid Up a Day For Repairs Since the Day We Bought It"

Arthur Walker,
Battle Creek, Mich.

That's about 100% efficiency, isn't it?

Think what a sales proposition this is—this Commerce Motor Truck.

Remembering that Mr. Walker, of the Bock-Walker Co., wholesale and retail hardware, is only one of hundreds who have written us to this effect. Continuing, Mr. Walker says:

> **"You may refer any prospective buyer to us, and we will gladly tell him of our wonderful experience with this truck."**

The object of this advertisement is to call special attention to the dependability of COMMERCE trucks, day in and day out, in hard service. To anybody who desires further evidence of how well satisfied the Bock-Walker Company is, we refer you direct to Mr. Arthur Walker.

It is upon the actual performance of COMMERCE trucks during the past seven years that we base our statement when we say that the COMMERCE truck agency is one of the most attractive truck agencies in the American market.

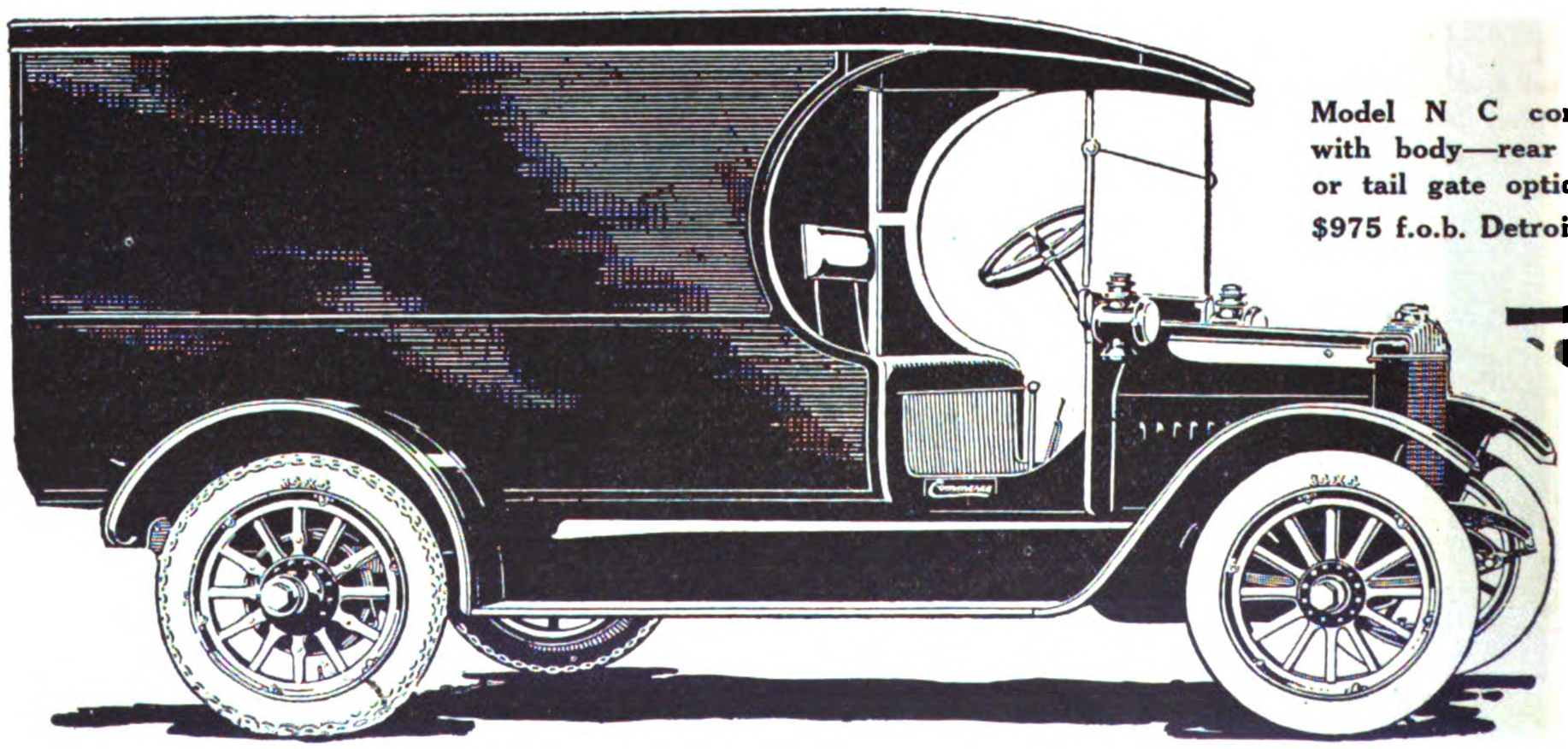
Hundreds of satisfied dealers and thousands of satisfied owners will bear out our claims unhesitatingly, and we are perfectly willing to submit our proposition to the proof of those familiar with COMMERCE trucks.

With the addition of the thoroughly proved one-ton line, the Commerce agency becomes even more attractive.

This one-ton COMMERCE truck is the most complete job ever offered the buying public. Everything that anybody could ask for—even including Remy electric starting and lighting equipment—is there; and the job as shipped is so complete that the dealer can get his money the day it is received.

Not only is it absolutely complete in every detail, but its parts are the highest quality obtainable

1500 Pounds **Complete** **Choice of 3 Bodies** **$975**



Model N C complete with body—rear doors or tail gate optional—$975 f.o.b. Detroit.

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Commerce TRUCKS

One Ton Completely equipped with Starting and Lighting System, Windshield, Stewart Vacuum System, Bumper, Pierce Governor and Open Express Body—Internal Gear Drive. **$1175**

at any price—Continental Motor; Jacox steering gear; Commerce type cast tank radiator; Torbensen internal gear rear axle; Bock & Bower roller bearings; Remy starting and lighting system with Willard storage battery; Stewart vacuum system; Zenith carbureter; Pierce governor; electric head lights, tail lights and powerful spot light; 2-year guaranteed silico manganese springs and a rigid bumper specially designed. Shipped in two body styles or just the chassis alone, fully painted—fully equipped—ready to be turned over to your customer.

In order to take care of a doubled capacity for next year we are practically doubling our selling force—and since the inception of this campaign we have more than half accomplished our work. However, we want only the highest grade representation obtainable, and for that reason we are closing contracts only with such dealers as we feel will give us the highest type of respresentation. Our discounts are large, our contracts are simple and in no way burdensome, and our co-operative efforts are particularly attractive.

In addition to that, we have a plan which provides for financing deferred payment sales, without the payment on the part of the dealer of any commission or brokerage fees, and which also enables the dealer to carry a large stock of trucks if he so desires.

If you feel that you can give us representation in your territory that is on a par with the proposition we offer you, we want to hear from you quickly. Don't delay a day, because there is a definite demand for this agency throughout the country.

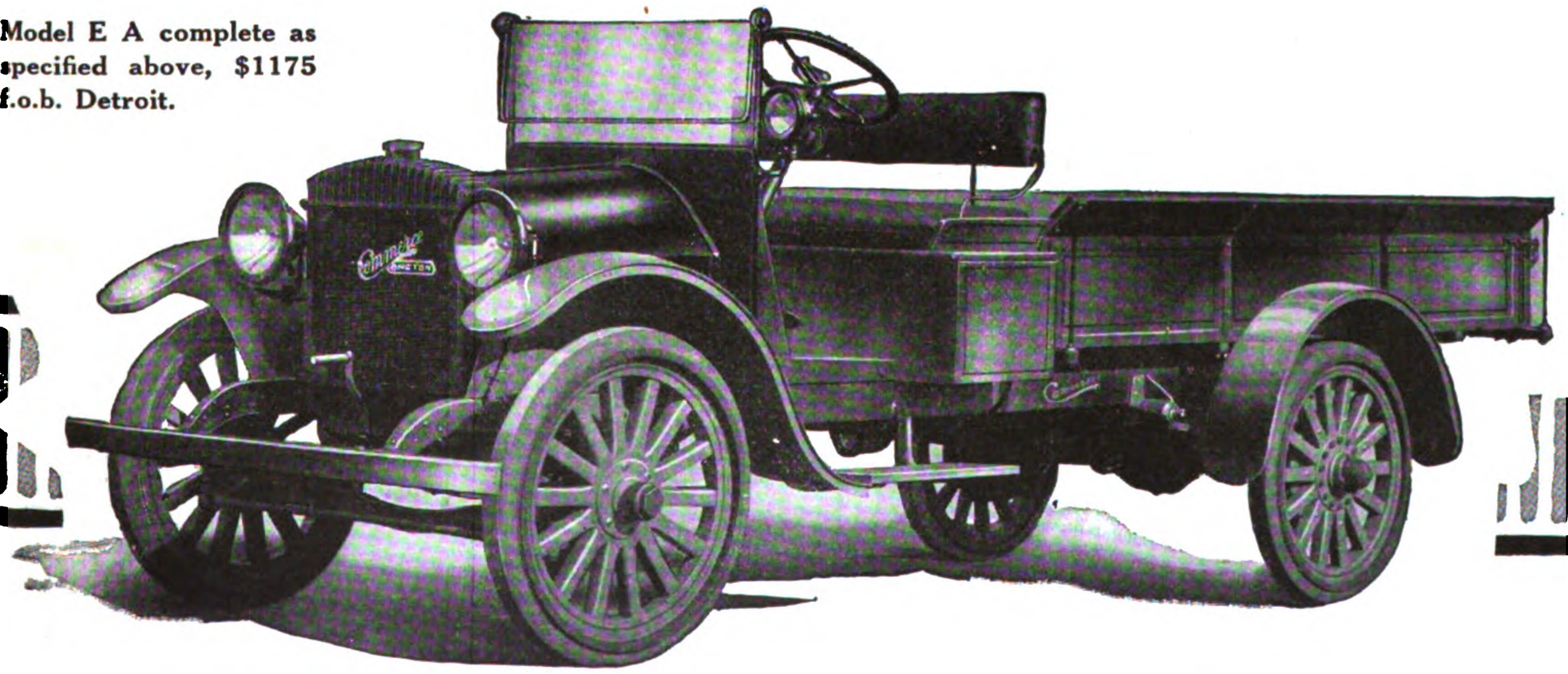
COMMERCE MOTOR CAR COMPANY

DETROIT MICHIGAN

W. H. BRINKERHOFF

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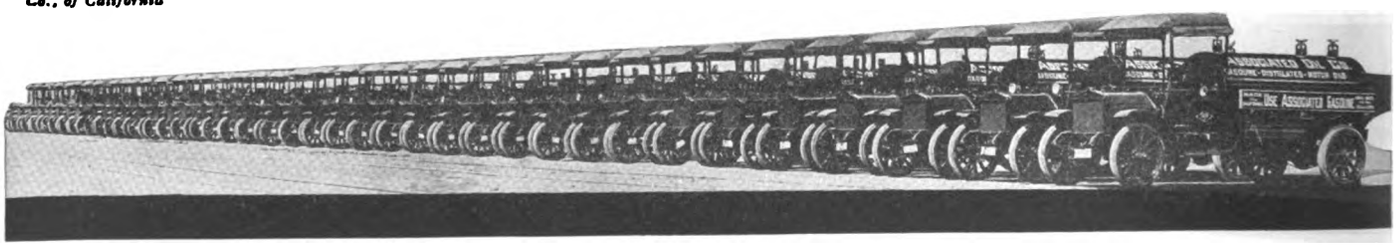
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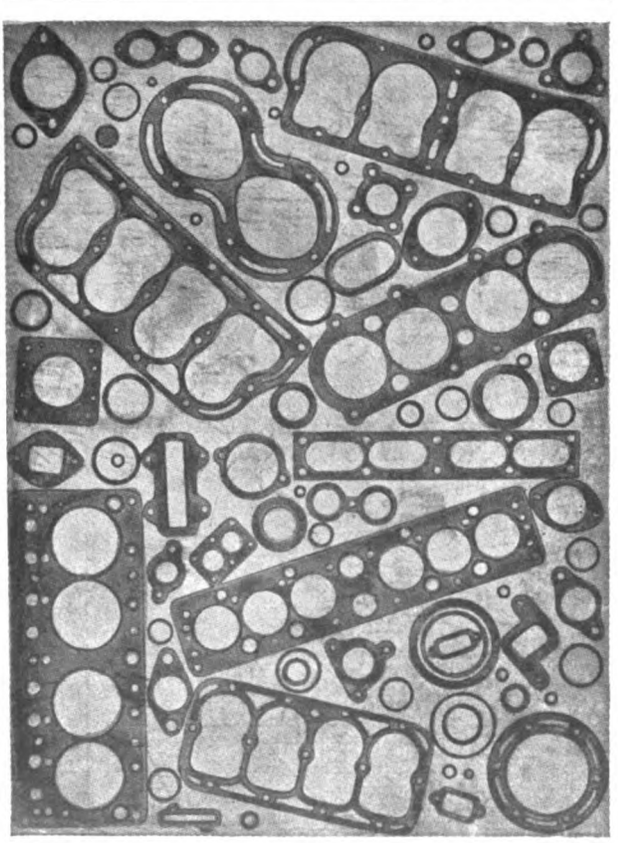
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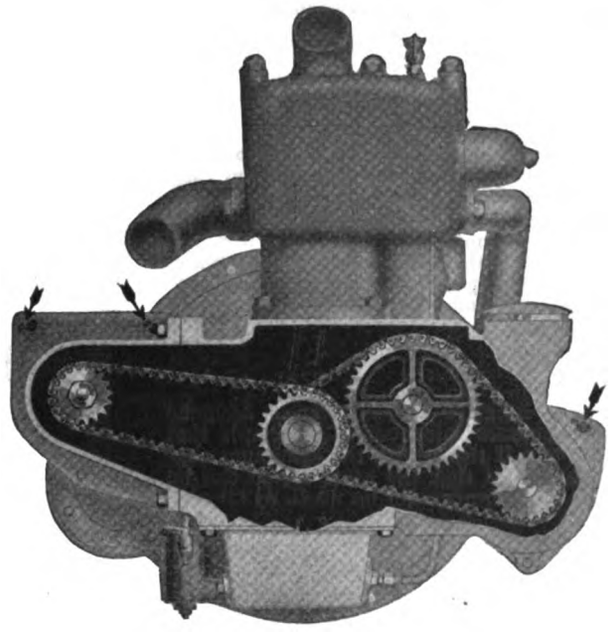
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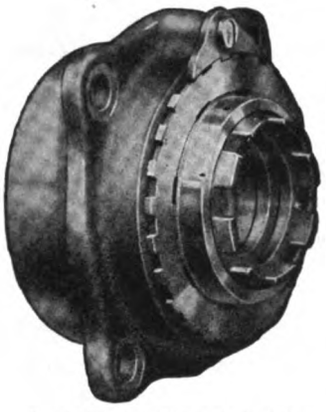
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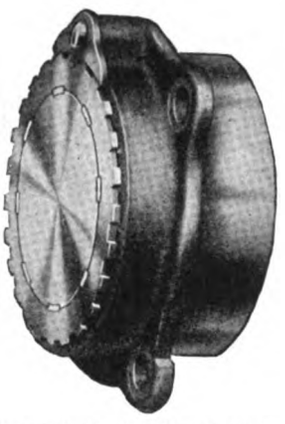


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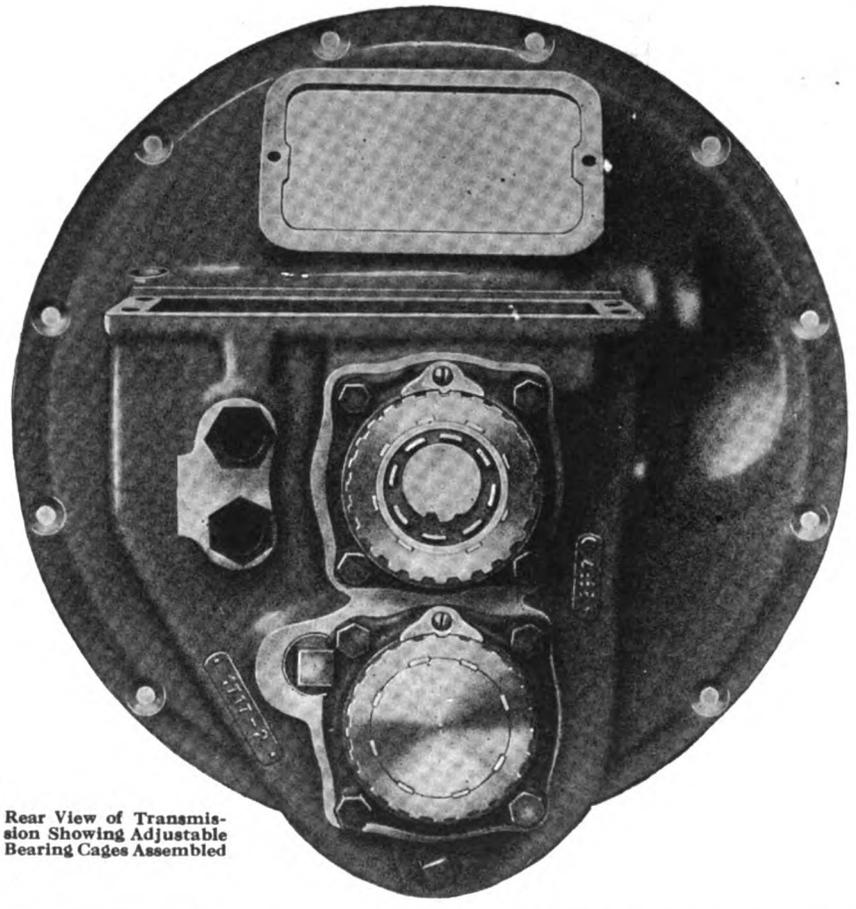
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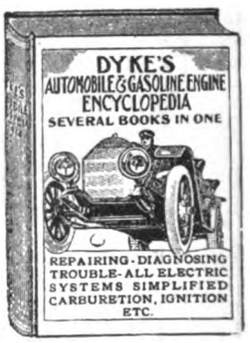
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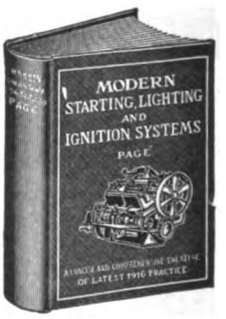
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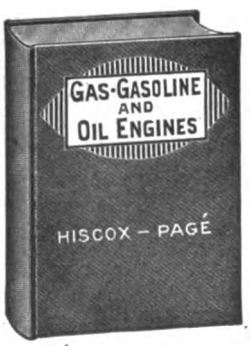


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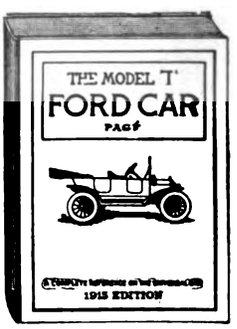
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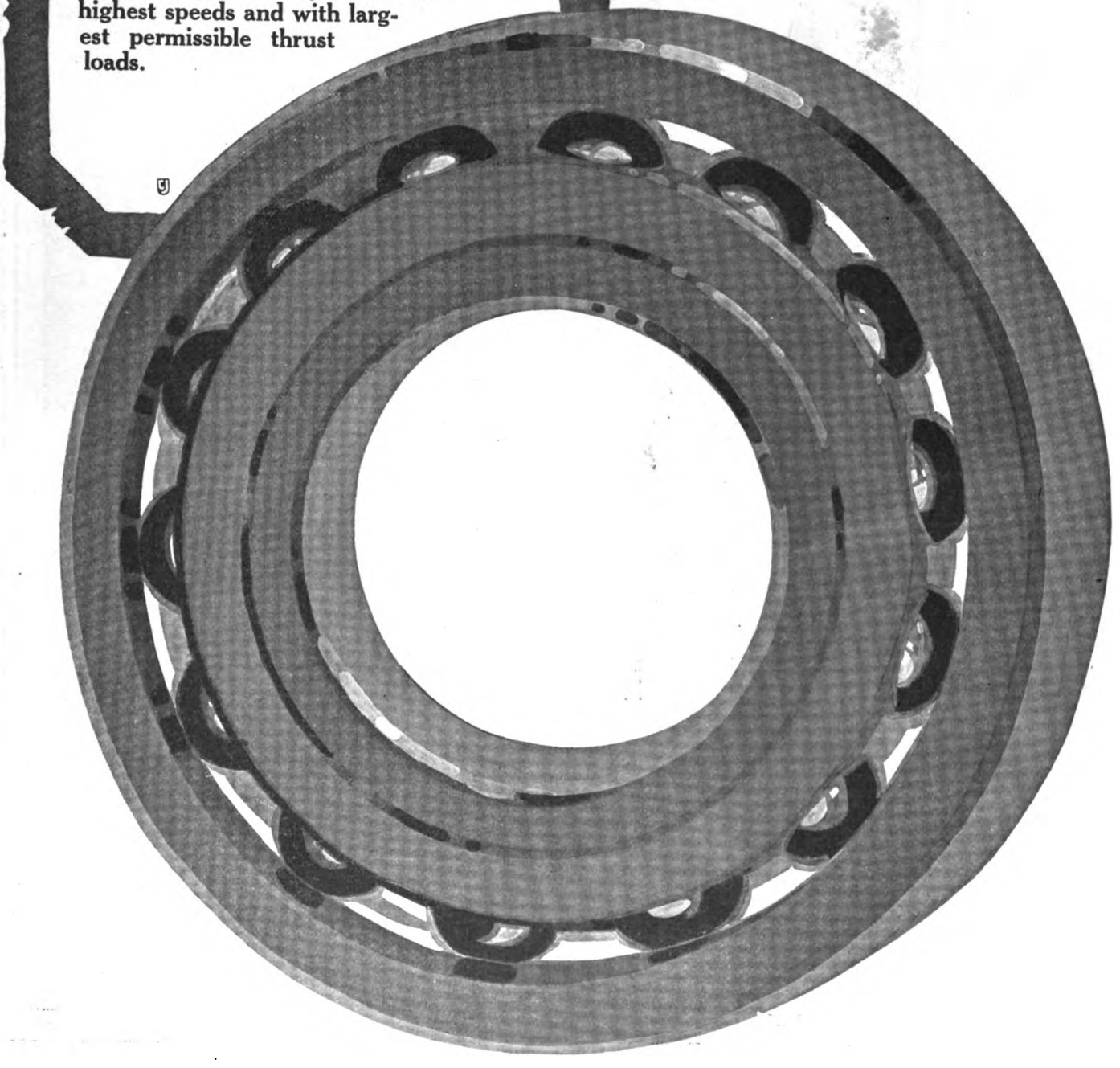
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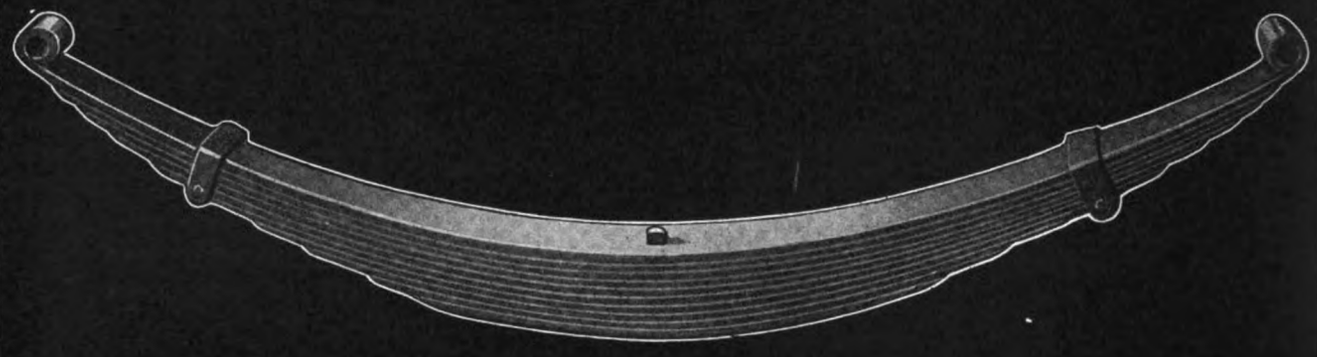
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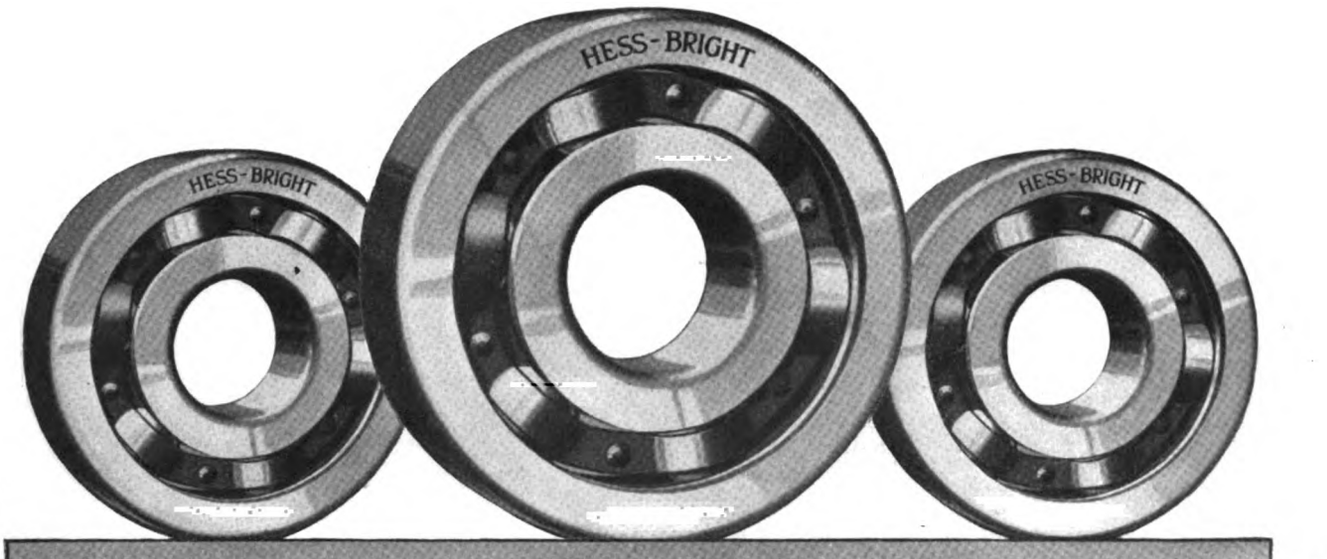
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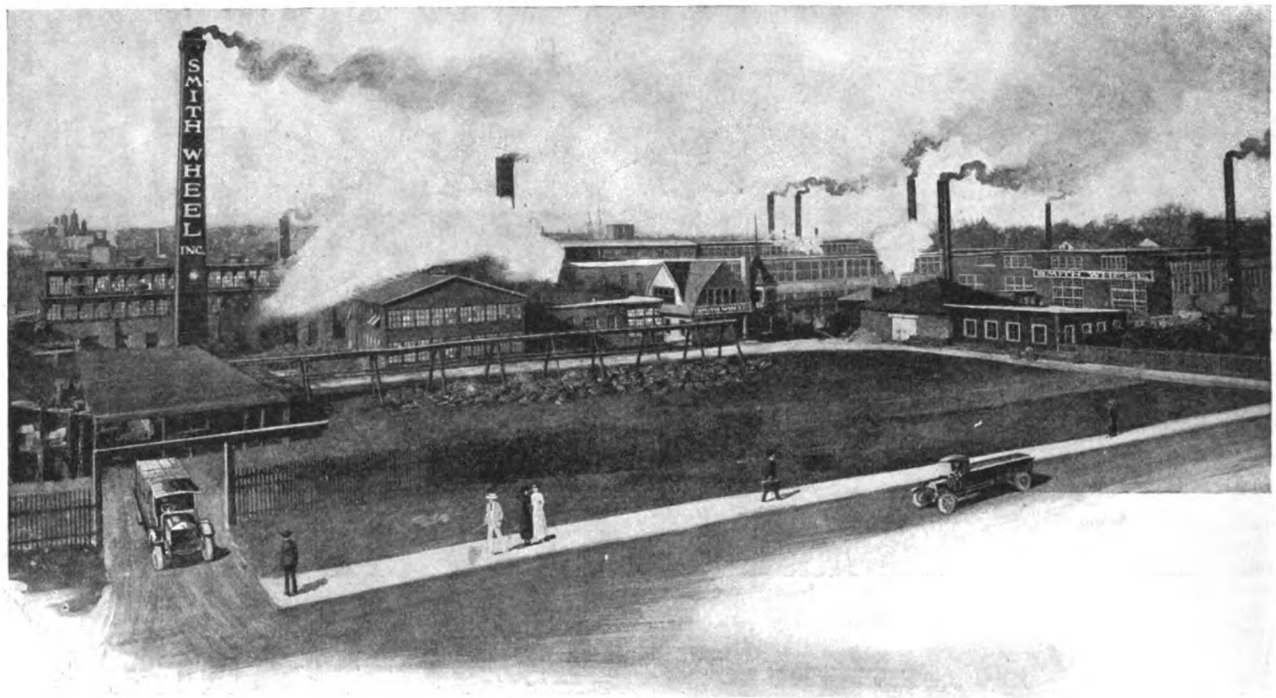
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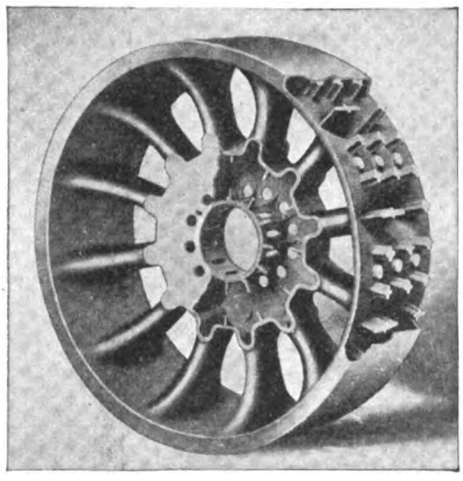
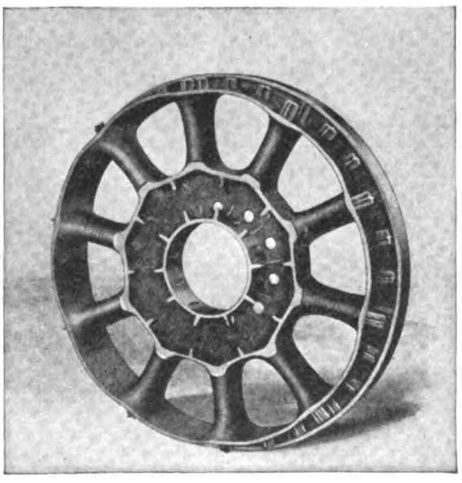
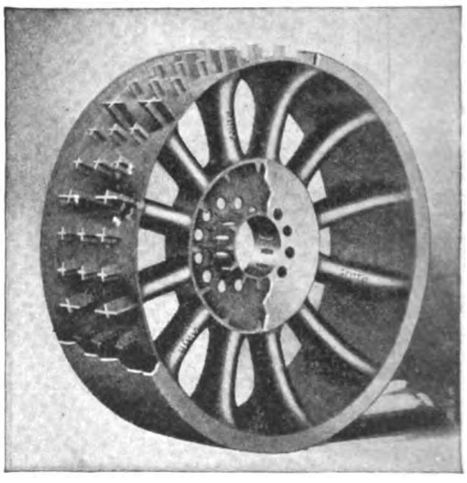
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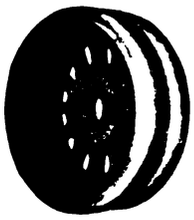
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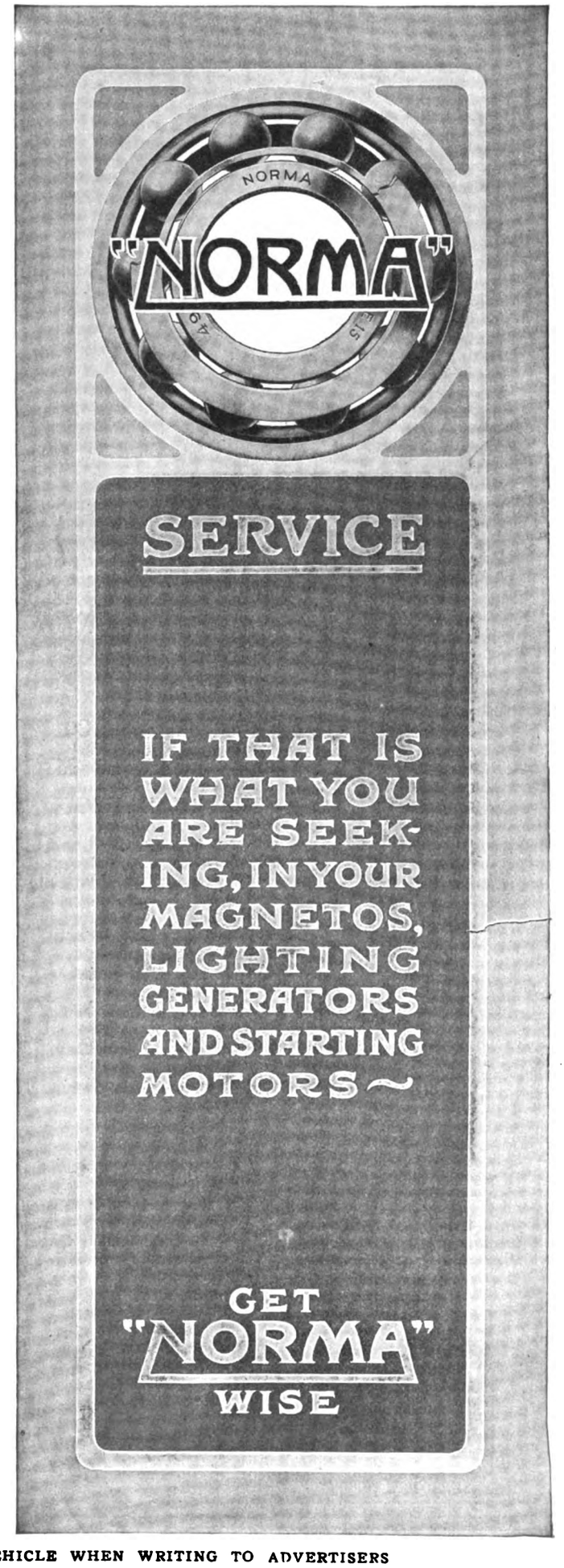
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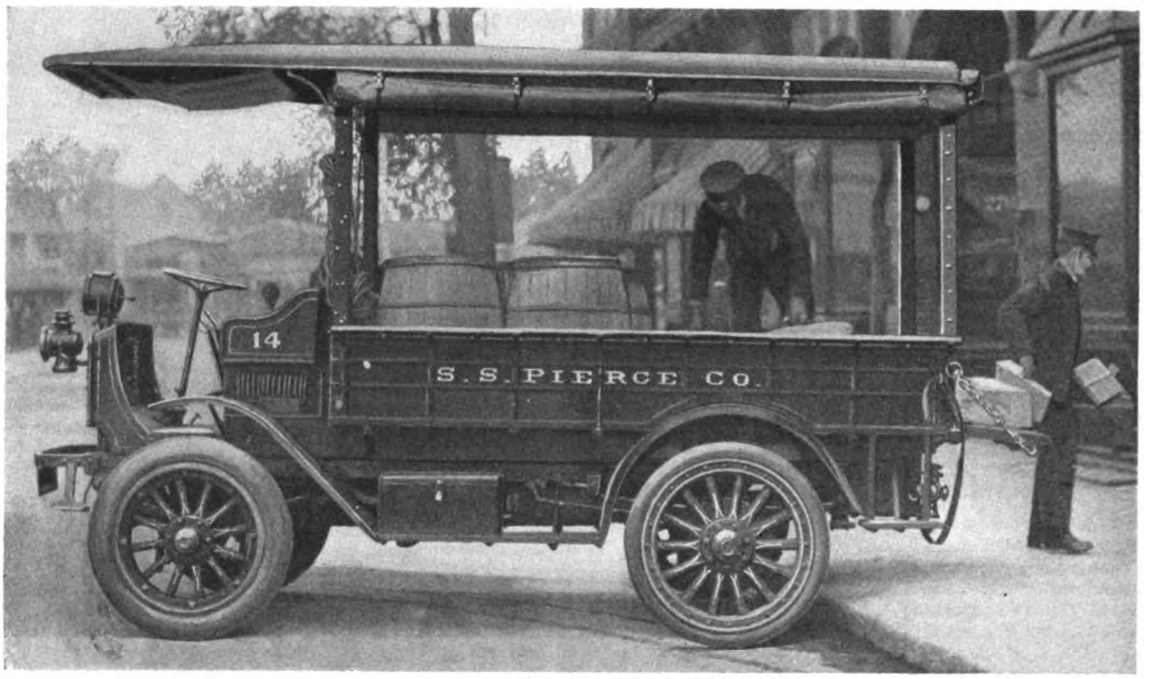
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Vol. XV December 15, 1916 No. 10

Proposed Truck Taxation Means Fight to Finish or Compromise

New York and New Jersey Seek to Tax Trucks but Not Passenger Cars and Horse Wagons for Road Cost—Constitutional Rights At Stake

A FIGHT to the finish on constitutional rights or a compromise.

These are the alternatives facing the motor truck owners and operators in the States of New York and New Jersey whose legislatures have formed commissions to devise new schedules of fees or taxes and restrictive measures to be based on the damage done to the roads by such vehicles.

The decision to be made in these two states is very liable to have a far-reaching effect in that other states may use such a decision as a precedent.

Due to the great increase in the use of motor trucks it is vital to the continued development of such means of road transportation that any such laws are not discriminatory or restrictive in nature. If laws of such character are permitted to be placed upon the statute books, they will affect not only the user of the motor truck, but also the concerns whose goods such vehicles transport.

How Tax Would Reflect

If the operation of motor trucks is made burdensome by high fees or taxes, it will mean that the charges for goods hauled by such means will be increased to cover the additional expense or that the number of trucks employed by small users will be curtailed. Thus the bill will have to be paid eventually by the public at large, for the truck operator will charge more for handling goods and the manufacturer will in turn set his selling price to the consumer at a higher figure in order to insure himself a reasonable profit. This means still another item added to the increased cost of living which has already risen to such an alarming degree that it has become necessary for the federal government to take an active part in its control.

As stated in the last issue of THE COMMERCIAL VEHICLE, the reasons for the attempt to increase the charges for motor trucks using the public highways are the rapid deterioration of the present roadways and the popular beliefs that those who use the roads should pay for them and that motor trucks are not taxed sufficiently at present as compared with other types of vehicles.

The rapid deterioration of highways is due to the greatly increased traffic over them. They were never built to withstand it. The coming of the motor vehicle and its great influence for the social and economical development of the country has progressed much faster than the development of adequate roads. Today many roads carry motor traffic far in excess of the total traffic of all classes carried 12 years ago, according to Circular No. 63 of the United States Department of Agriculture, published October 2, 1916, which also states that at that time there were about 2,500,000 motor vehicles in use on our public highways, or about one motor vehicle for each mile of road.

Injustice to Trucks

This motor traffic has increased much faster than the revenues for maintaining such roads of obsolete type until new and more durable kinds can be constructed. This has forced those in charge of the roads to endeavor to place the blame somewhere and it would appear that the motor truck has been selected to bear the burden because of its greater size and weight as compared with the passenger car and horse wagon.

Both of the commissions in New York and New Jersey are empowered to deal only with the motor truck, not the passenger car or the horse wagon. The New York State law, given in full below, specifically states that only the motor truck and the motor bus using the public highways shall be taxed for their use and the damage done thereto as the result of such usage.

Why Trucks Should Not Be Taxed for the Use of Roads

ROADS ARE A GREAT PUBLIC UTILITY—THEY BENEFIT THE NATION AT LARGE.

- They benefit those who use them and those who do not
- They increase realty values.
- They increase industrial development by making isolated territories accessible for factories and homes
- They permit rapid communication between industrial centers for both business and social intercourse
- They decrease illiteracy of the rural population by making central schools accessible.
- They have a direct bearing on the high cost of living because they enable goods to be hauled direct from the farms to cities or to railroads for cross-country shipments

BENEFITING THE COUNTRY AT LARGE, THEY SHOULD THEREFORE BE PAID FOR BY THE COUNTRY AT LARGE AND NOT ALONE BY THOSE WHO USE THEM.

ROADS MAY BE LIKENED TO RIVERS AND HARBORS—EACH IS A GREAT PUBLIC UTILITY.

- Last year the Federal Government spent $44,000,000 for the improvement of rivers and harbors in the United States.
- This work was paid for by the country at large
- Ships using these rivers and harbors are not taxed for their use of the water
- Why then should motor trucks be taxed for their use of the roads?

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This law* is evidently based on the assumption that it is constitutional to tax vehicles for the use of the roads—to make those that use the roads pay for them.

But is this constitutional?

Last year the Federal Government appropriated $44,000,000 for the improvements of the rivers and harbors of the United States. The country at large was taxed for this work. The man in New Mexico had to pay his share of the work done in New York harbor or that along the Mississippi river. The reason that he had to pay his share for the work in New York harbor along with the Gothamite or with the citizens of Indiana, Illinois, Missouri, Tennessee, Arkansas, Mississippi or Louisiana for the work along America's greatest river, was because the work done in each place will benefit the country at large.

Harbor Betterment Cuts Handling Costs

While it might appear that it was wrong to tax the New Mexico citizens for work entirely foreign to their state, the government did not so consider it because of the fact that the money to be spent in New York harbor or that to be spent in deepening or building levees along the Mississippi will have a direct effect on the cost of goods in New Mexico or any other state.

For the fiscal year ending June 30, 1916, a total of 20,874,073 tons of goods entered the port of New York on both foreign and coastwise ships. The money spent in New York harbor for the dredging of new and deeper channels, removing dangerous sand bars and reefs, as in the East river, enables larger ships to be employed and carrying goods more cheaply than smaller ones. Anything done to help reduce the cost of the delivery of such goods at the port will help to decrease the cost of those goods to the final consumer, be he in New Mexico, Illinois or any other state.

Still, these steamships and sailing vessels using New York harbor as a port of delivery are not taxed for the use of the water leading from the ocean up to their points of wharfage. They use it free because it enables our entire population to benefit by such usage. Accordingly, the population at large is charged for the cost of continuing the benefits accruing therefrom.

All Bear Share of Cost

Similarly, the New Yorker must pay his share of the development of the Mississippi because the improvement of that great north-and-south inland waterway enables goods to be transported from the gulf to the headwaters of the lakes or points from which it can be transshipped to the east or west. The river steamers and barges are not taxed for the use of the murky waters of the Mississippi.

The development of New York harbor and the Mississippi are only two of the harbors and rivers which benefited from the large Federal appropriation and are only mentioned here because they are perhaps the best known. All of this work has a direct bearing on the industrial growth of the country. Merchants are enabled to import goods more quickly and more economically through the port of New York, for instance, as the result of its deep channels, than if the goods had to be shipped in smaller ships and landed in Canada or some other Atlantic port a greater distance from the plants in which it was to be used. The transportation of goods in the latter manner would conceivably cost more than if shipped in large, fast ships running to New York where it could be easily transferred to the many railroads radiating from there.

The fact that the Federal government has taken from the states the work of keeping such harbors and rivers developed to such a degree as to meet the needs of the latest types of ships, is indicative that this work benefits the country at large. Benefiting the country at large, it is paid for by the country at large.

Ships Not Taxed for Use of the Water—Why Tax Trucks for Use of Roads?

Motor trucks are not bound by steel rails or time tables. They fill a niche in the rapid transportation of the world's goods which can be filled by no other means.

They are to the roads what the freight steamers are to the ocean—they are the argosies of the land. If the ships of the sea are not taxed for the use of our harbors and rivers, is it fair to tax motor trucks for the use of the roads? Is it not obviously unfair to tax such vehicles for their wear and tear on the roads when the service rendered benefits the public at large?

Now roads benefit the country at large. This cannot be disputed. Good roads increase the realty values of the territories through which they pass. They permit manufacturing plants to be established and homes built along their routes because they enable such plants and homes to be reached. They enable such factories to ship or receive goods by road, often in much less time than by railroads. This rapid transportation means a reduction in the cost of such goods to the final consumer, the public at large. Motor trucks are being used in greatly increasing numbers in the overland haulage of goods between adjacent cities in direct competition with the railroads. Motor trucks deliver from the plant of the seller to the factory of the purchaser without trans-shipment. The hauls to the freight yard at one end and from another yard at the rail destination to the factory of the purchaser are eliminated, as are also the costly delays met with especially in short-haul freight

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*LAWS OF NEW YORK—

CHAPTER 598.

AN ACT TO AMEND THE HIGHWAY LAW, IN RELATION TO THE REGISTRATION FEES FOR CERTAIN MOTOR VEHICLES.

BECAME A LAW MAY 19, 1916, WITH THE APPROVAL OF THE GOVERNOR. PASSED, THREE-FIFTHS BEING PRESENT.

THE PEOPLE OF THE STATE OF NEW YORK, REPRESENTED IN SENATE AND ASSEMBLY, DO ENACT AS FOLLOWS:

"SECTION 1. SECTION TWO HUNDRED AND EIGHTY-TWO OF CHAPTER THIRTY OF THE LAWS OF NINETEEN HUNDRED AND NINE, ENTITLED 'AN ACT RELATING TO HIGHWAYS, CONSTITUTING CHAPTER TWENTY-FIVE OF THE CONSOLIDATED LAWS,' AS AMENDED BY CHAPTER THREE HUNDRED AND SEVENTY-FOUR OF THE LAWS OF NINETEEN HUNDRED AND TEN, CHAPTER FOUR HUNDRED AND NINETY-ONE OF THE LAWS OF NINETEEN HUNDRED AND ELEVEN AND CHAPTER THREE HUNDRED AND FORTY-EIGHT OF THE LAWS OF NINETEEN HUNDRED AND FIFTEEN, IS HEREBY AMENDED BY INSERTING THEREIN A NEW SUBDIVISION, TO BE SUBDIVISION SIX-A, TO READ AS FOLLOWS:

"6-A. REGISTRATION FEES FOR AUTO TRUCKS AND BUSES. THE COMMISSIONER OF HIGHWAYS, THE SUPERINTENDENT OF PUBLIC WORKS AND THE STATE ENGINEER AND SURVEYOR SHALL ON OR BEFORE JANUARY 1, NINETEEN HUNDRED AND SEVENTEEN, ADOPT AND FILE IN THE OFFICE OF THE SECRETARY OF STATE A SCHEDULE OF REGISTRATION FEES TO BE PAID UPON THE REGISTRATION OR RE-REGISTRATION, IN ACCORDANCE WITH THE PROVISIONS OF THIS ARTICLE, OF MOTOR VEHICLES USED AS BUSES FOR THE TRANSPORTATION OF PASSENGERS AND OF MOTOR VEHICLES, COMMONLY KNOWN AS AUTO TRUCKS, AND USED FOR THE TRANSPORTATION OF GOODS, WARES AND MERCHANDISE; AND IN FIXING SUCH FEES SHALL CLASSIFY SUCH MOTOR VEHICLES UPON THE BASIS OF THE TIME AND EXTENT OF THEIR USE OF THE PUBLIC HIGHWAYS AND THE RELATIVE WEAR AND TEAR OF THE PUBLIC HIGHWAYS BY REASON OF THEIR USE THEREON. THE SECRETARY OF STATE SHALL CAUSE SUCH SCHEDULE TO BE PRINTED AND COPIES THEREOF DISTRIBUTED UPON APPLICATION. THE FEES PRESCRIBED BY SUCH SCHEDULE SHALL TAKE EFFECT FEBRUARY 1, NINETEEN HUNDRED AND SEVENTEEN, AND SHALL, AS TO THE MOTOR VEHICLES INCLUDED IN SUCH SCHEDULE, SUPERSEDE THE PROVISIONS OF SUBDIVISION SIX OF THIS SECTION AS TO THE AMOUNT OF REGISTRATION FEES THEREFOR.

"2. THIS ACT SHALL TAKE EFFECT IMMEDIATELY."

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shipments. In the latter work, it sometimes takes the railroad 2 or more days to deliver a shipment which can be delivered in 2 hours by motor truck.

Aside from the part which motor trucks and good roads play in the industrial development of the nation, they also play an important rôle in the social advancement of the country. They enable persons in isolated sections not served by railroads or trolley lines to reach the large towns nearby either for business or social intercourse, and open up areas not previously accessible.

Roads Are a Great Public Utility Upon Which Growth of Nation Depends

Roads are also a potent force in the educational development of children in rural communities. Because of the lack of good roads in our country territory, a large majority of the 2,500,000 miles of our existent country roads are impassable during considerable of the school term. As a result, of the 30,000,000, or more children in the United States who could attend school, only 18,000,000 make any effort to do so. A direct connection between good country roads and illiteracy has been established by S. M. Williams of the Garford Motor Truck Co., Lima, Ohio, who found that in 1909 the New England states had 22.2 per cent of improved roads and a percentage of illiteracy of 1.7. On the other hand, the South Atlantic states, with only 6.7 per cent of improved roads, showed an illiteracy four times as great in the rural population as compared with the urban population while in the New England territory it was but 1.4 times as great. Only native whites were considered in each comparison. According to Mr. Williams' figures, the percentage of illiteracy among the urban white population the country over is estimated at 9/10 per cent while the illiteracy among the same class of rural inhabitants is 699 per cent greater.

Government Spends 50 Millions

That the Federal government considers roads of benefit to the country at large is borne out by the $50,000,000 appropriation made under the Federal Aid Road Act, passed July 11, 1916, and reported in THE COMMERCIAL VEHICLE of August 1, 1916. That large fund is proportioned among the states, one-third in the ratio of area, one-third in the ratio of population and one-third in the ratio of mileage of rural delivery routes and star routes. After deducting 3 per cent, or $150,000, for administration requirements, the total available sum for the fiscal year ending June 30, 1917, amounts to $4,850,000. Other sums will be appropriated as follows:

1918	$10,000,000
1919	15,000,000
1920	20,000,000
1921	25,000,000

Now if the Federal government considers roads of sufficient benefit to the country at large to appropriate approximately $120,000,000 of the general funds secured from the country at large, why should the states of New York and New Jersey seek to tax vehicles for their use of the roads and employ such funds when collected to build new roads and maintain old ones entirely unsuited to motor vehicle traffic? Roads are made for vehicles to use. If they are a benefit to the country at large, as borne out by the Federal appropriation, why tax the vehicles for their use when they are already taxed as personal or corporation property?

Panama Canal Proves Case

Those in favor of taxing motor vehicles for their use of the roads point to the Panama canal as an example of the right to tax those who use a public utility for its cost and maintenance. In this connection it must be remembered that it was originally intended that American ships whose owners had helped pay for the cost of the canal be exempted from paying tolls, and that this condition was not fulfilled only because of diplomatic reasons.

Other similar cases of public utilities can be cited which benefit the public in any given territory and for which no special tax is made upon those who make use of that utility. For instance, persons who call the fire engines when their houses are burning are not forced to pay a special tax each time they help wear out the roadways and the apparatus by calling it to their homes. Nor are people made to pay a special tax when they call upon the police force to save their goods from theft because the policeman's shoe leather is worn out or the life of the patrol wagon shortened.

When these phases of the subject are considered, why should any kind of vehicle be charged for the use of public roads which benefit the country at large?

This is the question which motor truck owners of New York and New Jersey must answer. They must protest any taxation of vehicles on the grounds of unconstitutionality or they must compromise.

It must be remembered that the fees charged passenger motor vehicles in New York state are a compromise reached betweeen the state legislators and the motor vehicle interests of owners, dealers and manufacturers. They are paid without protest in lieu of the elimination of the cars as personal property liable to taxation. These same legislators realize that if they attempt to increase the fees on the private passenger car, they will call down upon their heads the concerted and organized attack of the well-organized passenger car interests who will fight them to a finish on the question, perhaps having each owner pay the increased fee under a protest. That would involve the state in a legal tangle which would take several years to unravel.

In the present situation it is for the motor truck interests to decide if they will follow a similar plan to uphold their constitutional rights or effect a compromise along the lines of the present passenger car charges. It must be remembered in this connection that if a compromise is made at this time, it is liable that the matter will be re-opened by a future legislature when it desires to raise additional money for road maintenance, in other words, that a compromise now is simply putting off the day of reckoning when a final showdown will be necessary.

Some truck owners are in favor of waiving their constitutional rights provided the new fees are nominal, under the belief that the new roads suitable for motor truck use will become a reality much sooner if they help pay the cost of the new work than if they enter into a legal fight which might last for several years, meantime forcing them to use the present poor highways. This course of action, while it may accomplish its purpose, is considered poor policy by others in that it will give a precedent for the taxation of motor trucks for their extent of use of the roadways and the damage done to them.

Owners Go on Record

The Motor Truck Club of America, Inc., New York City, has taken an active part in protesting against the proposition of taxing trucks on the basis of their wear and tear on the roads on the grounds that it is impossible to determine the varying degrees of such wear without considerable experimentation. While it will not relinquish its right to contest any new schedules of fees for the maintenance of roads in either New York or New Jersey on the grounds that any vehicle should not be so taxed, it does demand a tax on all types, including horse wagons and passenger cars, should its constitutional privilege be waived.

If this is to be done it favors a nominal fee to cover the cost of registration plates and the bureau issuing the same and a separate tax for all classes

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of vehicles. It maintains that New York's and New Jersey's present proposals to tax motor trucks on their use of the roads and the damage done thereto without taxing passenger cars and horse wagons is eminently unfair, discriminatory and unconstitutional.

Tax All Vehicles If Any

It points out that aside from the degrees of wear and tear caused by various kinds of trucks of various weights, with various kinds of tires, etc., it must be admitted that passenger cars and horse wagons wear out the roads to some small degree at least, and that these two classes must be taxed for that amount if motor trucks as a class are going to be charged for their share.

Just what definite proposals the New York State Commission concerned with the work of formulating a new schedule of fees as per the law given on page 6 will do, is difficult to state at this writing for the reason that it has held only one public hearing and nothing definite was given out at that time nor has anything concrete been offered since.

New Jersey's Proposals

The New Jersey Commission, on the other hand, has made public all of the proposals it will make to the legislature of that state with the exception of the new fees which are expected to be in excess of the present ones, which vary from the minimum of $5 to a maximum of $25. It is proposed to tax pneumatic-tired commercial vehicles on the same basis as passenger cars.

A digest of the most important items of the New Jersey proposals, which are given in their revised form on page 9, is as follows:

1—The prohibition of metal tires on any types of commercial vehicles.

2—That all commercial vehicles shall be equipped with sealed governors or other automatic controls, by which their speed shall be regulated not to exceed the schedule given on this page.

3—That no commercial vehicle shall be equipped with a center searchlight.

4—That not more than one trailer or semi-trailer shall be used with any commercial vehicle, and that in every case the trailer wheels must be rubber tired.

5—That in case of damage to a motor truck tire such that the rim comes into contact with the road surface, the truck must stop and remain stationary on the spot until repairs have been made under a penalty of a $500 fine.

6—That every truck carry a plate stating the maximum weight of the vehicle with body and full load; the net load and the maximum speed at which it is capable of being operated. In addition, an affidavit must be sworn to at the time the license is secured that neither the maximum load nor the maximum speed of such truck will be exceeded at any time.

7—That trailers shall be licensed on their carrying capacities.

8—That tire sizes and wheel diameters and permissible weight per wheel be determined upon complicated and involved requirements which are very difficult to understand in their present form.

9—That a truck will be responsible for any damage done to a bridge should the truck happen to fall through it. No provision is made for placards showing the safe carrying capacity of bridges.

10—That motor vehicle inspectors shall be empowered to mount motor trucks and test them for speed, and if necessary run them to the nearest scale to determine if they are carrying a heavier load than stated on the plate on the truck as mentioned in paragraph 6.

The Motor Truck Club of America has also presented a brief to the New Jersey commission as well as the one in New York, pointing out that its belief that motor trucks with other than rubber tires should be permitted provided the speed is restricted to 7 or 8 m.p.h.

It strongly protested against the provision requiring that all trucks be equipped with sealed governors on the ground that all such devices do not permit vehicles from coasting down grades at an excessive speed, and that such mechanisms can be very easily tampered with to destroy their efficacy. It was also pointed out that many of the motors in trucks now in use could not be equipped with sealed speed-regulating devices without considerable expense. It was further brought to the commission's attention that the speed of a truck is not detrimental to public safety, and that such speed should be left to the traffic policemen, as is the case with passenger cars.

The elimination of the center searchlight on a motor truck is desired because several accidents have occurred on New Jersey roads where passenger cars ran into trucks using such lights by mistaking them for motorcycles. It was claimed that these collisions were due to the fact that the truck's side lights were out. While it would seem reasonable to require that side lights be kept burning at all times, it seems eminently unfair to bar the center searchlight because it is a vital necessity to lighting up unfamiliar country roads so that the truck will not run off into the ditches.

Trailer Units Protested

The provision seeking to limit one trailer to a truck and the use of rubber tires on all trailers, whether of the four-wheeled or two-wheeled type, was strongly protested on the grounds that more than one trailer should be permitted where there was no traffic congestion, and that the use of steel-tired trailer wheels were not detrimental to the roads provided the speed of the vehicles were not excessive. It was also pointed out that many of the semi-trailer wheels are 60 inches in diameter, and that no tires are now on the market of this diameter which are sufficiently wide to carry the loads now usually transported on such vehicles.

The proposed requirement that tire repairs be made on the spot before the vehicle proceeded to move from the point at which the tire damage was noted was protested on the ground that in the case of pressed-on solid tires the movement of the truck on the iron band shrunk around the wood felloe to take the steel base would not damage the road. It was also contended that tire repairs on the road are not easily made because some form of derrick or crane has to be brought to the scene to take off or put on a new 800-pound wheel and tire, and that the truck should be allowed to run to the nearest garage provided it did

New Jersey's Proposed Truck Speeds and Tire Sizes

MAXIMUM WHEEL LOADS IN POUNDS AND MAXIMUM SPEED IN MILES PER HOUR FOR MOTOR AND MOTOR-DRAWN VEHICLES EQUIPPED WITH TIRES OF A GIVEN SIZE AND DIAMETER

Size of Tires, Single	Diameter of Wheel and Carrying Capacity						Speed Miles Per Hour for Rear Wheels
	32-In.	34-In.	36-In.	38-In.	40-In.	42-In.	
2 inches.....	565	595	625	660	690	720	20
2½ inches.....	840	890	940	990	1,040	1,090	20
3 inches.....	1,125	1,190	1 250	1.315	1,375	1,440	20
3½ inches.....	1,415	1,490	1,565	1,640	1,715	1,790	18
4 inches.....	1,690	1,780	1,875	1,970	2,065	2 155	16
5 inches.....	2,250	2,375	2,500	2,625	2.750	2,875	14
6 inches.....	2,815	2,970	3,125	3,285	3,440	3,695	12
7 inches.....	3,375	3,565	3,750	3,940	4,125	4,315	10
Double							
2 inches.....	1,125	1,188	1,250	1,312	1,375	1,438	18
2½ inches.....	1,675	1,775	1,875	1,975	2,075	2,175	18
3 inches.....	2,250	2,375	2,500	2,625	2,750	2,875	16
3½ inches.....	2,825	2,975	3,125	3,275	3,425	3,575	14
4 inches.....	3,375	3,560	3,750	3,940	4,125	4,310	13
5 inches.....	4,500	4,750	5,000	5,250	5,500	5,750	12
6 inches.....	5,625	5,940	6,250	6,565	6,875	7,190	10
7 inches.....	6,750	7,125	7,500	7,875	8,250	8,625	10

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not actually damage the road in so doing.

In regard to the provision to require a sworn affidavit that a truck would not exceed its maximum speed limit or carry above its maximum load, it was pointed out that such a restriction was unnecessary in view of the fact that truck users are learning that carrying heavy overloads is very destructive on the vehicle mechanism and shortens its life to a considerable extent.

No opposition was offered to licensing four-wheeled trailers on their carrying capacity, but considerable protest was made on the proposed manner of licensing tractors on their gross operating weight at the prices fixed in the table shown on this page, and charging a semi-trailer another fee based on its carrying capacity at the price fixed for the gross weight. For example, a tractor weighing 4 tons, or 8000 pounds, would be taxed $25. If it hauled a semi-trailer with a carrying capacity of 10 tons, or 20,000 pounds, it would have to pay a tax of $30, making the total tax for the outfit $55. These figures are taken from the proposed schedule of fees as given on this page, but which are not the final charges to be made, according to the chairman of the commission.

In regard to the tire widths and wheel diameters for permissible wheel loads, it was suggested that some simple rule regulating the weight per inch of tire width and the speed by a certain factor would be much more preferable to the complicated table shown on page 8.

The suggestion to make trucks liable for damages to a bridge whose safe carrying capacity was not stated in a placard prominently placed was very strongly objected to on the grounds that all bridges should be kept in proper condition to carry the vehicles which may run over the roads leading to them, and that if the engineers in charge of such bridges could not tell the safe carrying capacities of such structures, it was more than certain that motor truck drivers could not tell them.

The proposed regulations are given in full as follows:

New Jersey's Proposed Truck Fees

SCHEDULE SHOWING ANNUAL FEE AND FEE IN SEPTEMBER BASED ON GROSS WEIGHT

Gross Weight of Truck and Carrying Capacity, Pounds	Annual Fee*	Fee in Sept.*
4,000 or less.....	$15.00	$7.50
4,000 to 5,000.....	17.50	8.75
5,000 to 6,000.....	20.00	10.00
6,000 to 7,000.....	22.50	11.25
7,000 to 8,000.....	25.00	12.50
8,000 to 9,000.....	27.50	13.75
9,000 to 10,000.....	30.00	15.00
10,000 to 11,000.....	32.50	16.25
11,000 to 12,000.....	35.00	17.50
12,000 to 13,000.....	40.00	20.00
13,000 to 14,000.....	45.00	22.50
14,000 to 15,000.....	50.00	25.00
15,000 to 16,000.....	55.00	27.50
16,000 to 17,000.....	60.00	30.00
17,000 to 18,000.....	65.00	32.50
18,000 to 19,000.....	70.00	35.00
19,000 to 20,000.....	75.00	37.50
20,000 to 21,000.....	81.25	40.63
21,000 to 22,000.....	87.50	43.75
22,000 to 23,000.....	93.75	46.88
23,000 to 24,000.....	100.00	50.00
24,000 to 25,000.....	106.25	53.13
25,000 to 25,875 .....112.50		56.25

*Fees not yet decided upon.

New Jersey's Proposed Motor Truck Regulations

"1—No commercial vehicle or truck shall be more than 96 in. in width outside measurement; in extreme cases the Commissioner of Motor Vehicles shall be privileged to issue permits for the operation of motor vehicles or trucks with a width of load over 96 in., where the weight of the load is not a factor.

"2—That no commercial vehicle or truck shall be equipped with metal tires that may be in contact with the surface of the road, nor shall any such vehicle or truck be equipped with any tires which have a partial contact of the metal with the surface of the road.

"3—That no commercial vehicle or truck shall be equipped with any tire, covering of metal or with any lugs or hobs, or other sharp devices, which would be in contact with the surface of the road; chains may be used in accordance with the Motor Vehicle Act."

(Traction and Agricultural Machines.)

"That any vehicle whose equipment does not comply with this act may be licensed by the Commissioner of Motor Vehicles to travel upon the highways in cases where coverings of wood or other substance is attached to the wheels in such manner as to present a smooth surface, and in accordance with regulations fixed by the Commissioner. That the speed of such vehicles shall not exceed the rate of 4 miles per hour.

"4—That the height of all commercial vehicles or trucks including load be limited to 12 feet 2 inches.

"5—That all commercial vehicles or trucks shall be equipped with sealed governors or other automatic controls, by which the speed shall be regulated, not to exceed the schedule attached hereto.

"6—That no commercial vehicle or truck shall be equipped with a center searchlight, but that the lights of all commercial vehicles or trucks shall be in conformity with section four of the Motor Vehicle Act.

"7—That the extreme length of motor vehicles or trucks shall not exceed 26 ft. 6 in.

"8—That not more than one trailer or semi-trailer shall be allowed to any commercial vehicle or truck; that in every case said trailer or semi-trailer shall be equipped with rubber tires.

"9—That in case of damage to the tire or to the wheel of any commercial vehicle or truck when traveling on any of the highways of the State, when such damage is of a character to permit the metal rim or metal portion of wheel to come in contact with the surface of road, that in such case the vehicle or truck shall immediately stop and shall not be moved until proper repairs are made. That a penalty of $500 shall be levied by the Commissioner of Motor Vehicles for each offense contrary to the provisions of this section.

"10—That there shall be provided and placed in a conspicuous place on the left side of each chassis a metal plate, which shall contain the following information:

Maker's name.
Maker's number of chassis.
Model.
Motor No.
Maximum weight of truck with body and load, ...lbs.
Net load, ...lbs.
Maximum speed, ...miles per hour.

"An affidavit at time of registration shall be required from the licensee that the maximum weight in accordance with said plate shall not be exceeded.

"11—That the commercial size of tires used on all commercial vehicles or trucks shall be determined on the maximum width of rubber, and in no case shall the width of bearing surface unloaded be less than two-thirds of the commercial size.

"12—That all license fees for four-wheeled trucks shall be based on the maximum wheel load carried on same, said wheel load to be determined by the size of tire used and adopted in conformity with the schedule hereto attached.

"13—That all trailers shall be licensed on their carrying capacity; where the carrying capacity in pounds is equivalent to the gross weight of load in schedule for license fees, the charge shall be the same.

"All trailers are four-wheeled vehicles.

"Tractors are motor-powered vehicles without bodies and shall be licensed on their gross operating weight at the prices fixed in the schedule for gross weight. Size of wheel and tire and rate of speed shall conform to articles 16, 17 and 18 of this report.

"Semi-trailers are two-wheeled vehicles without motor power and shall be licensed on their carrying capacity at the price fixed for gross weight. Size of tire and wheel and rate of speed shall conform to Articles 16, 17 and 18 of this report.

"14—That all Counties in the State shall place signs showing the clearance on all bridges in their respective Counties, if the clear headroom is less than 12 feet 6 inches.

"15—That a special permit be secured from the Commissioner of Motor Vehicles for the use of trucks as pleasure vehicles.

"16—That trucks, tractors, trailers or semi-trailers equipped with tires smaller than required as per schedule, shall not be licensed.

"17—Loads for rear wheels of motor or motor-drawn vehicles. That one-third of the gross weight of truck and carrying capacity combined must be within the limits of the schedule of the respective diameter of wheel, size of tire and speed in miles per hour, as shown in the schedule hereto attached.

"18—Loads for front axles of motor or motor-drawn vehicles. That the front axle shall carry the balance of the gross weight of truck and load combined and must be within the limits of the schedule of the respective diameter of wheel, size of tire and speed in miles per hour for single tires, as shown by the schedule hereto attached.

"19—That all commercial vehicles or trucks carrying any load extending beyond the sides or ends of the outside dimensions of said vehicles or trucks shall have displayed at the outside extremity of load a red flag by day which shall not be less than 12 inches square and a red light by night, and they shall be so hung as to present a full view of the approaching vehicles.

"20—All commercial vehicles or trucks equipped with pneumatic tires shall be licensed in accordance with the Motor Vehicle Act governing pleasure vehicles.

"21—That all owners of motor vehicles or trucks licensed within the schedule hereto attached will be responsible for any damage done to any bridge where the gross weight carried by the truck exceeds the carrying capacity of bridge.

"22—That the motor vehicle inspectors appointed in accordance with the Motor Vehicle Act shall be authorized to pass upon the weight and speed of any commercial vehicle or truck licensed in accordance with the provisions herein contained. That such inspectors be empowered to make such tests as are necessary to determine the above."

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Principle or Expediency

THE tendency now becoming prevalent throughout this country to tax motor trucks for their use of the public roads has resolved itself into an issue of principle or expediency. It is a case of fighting to a finish any and all taxes levied on motor trucks for the maintenance of roads, upon the grounds of unconstitutionality, or of waiving such constitutional rights and compromising on what may be considered a nominal tax.

A fight to the finish may take several years. It certainly will cost a good-sized pile of money. But will it not be worth it? Will it not cost less in the long run to settle the question once and for all than to put off the day of reckoning by accepting a compromise now?

Will not submission to a higher truck tax at this time give a precedent to future State legislatures to endeavor to again increase taxes should the occasion arise for the need of additional money for road construction and maintenance?

This is exactly what has occurred in the past. We are not to-day at the beginning of motor truck taxation. We are at the end of a period of taxation which dates back to the time when trucks first became recognized as the most efficient means of rapid road transportation. Then they were taxed a nominal fee, which, while in excess of that necessary purely for registration purposes, was not considered a direct tax for the upkeep of roads. The tax at that times was kept at a nominal amount because of the popular feeling that the truck industry was an infant one whose growth was essential to the public good and one which should not be hampered by excessive taxes.

Then as the public demand for quick and cheap road transportation increased and with it the number of motor trucks, legislatures forgot the good which the truck had done and sought to increase their taxes because of the rapid deterioration of the utterly inadequate roads and the immediate necessity of raising additional road-building funds. In many cases, as for example in the State of Connecticut, taxes were increased from a nominal fee to more than $100 for a large truck.

Now the legislature of the great State of New York has become bold enough to pass a law which specifically states that motor trucks shall be taxed for their use of the public highways.

If it is unconstitutional to tax trucks or any other kind of vehicles for the use of roads which benefit the nation at large, why not prove it now?

Taxation of motor trucks for the use of the roads affects every one of us. How it will affect truck maker, dealer and owner is patent to all. If the operation of motor trucks is made burdensome by high taxes, it will simply mean that the cost of handling goods will be increased. This in turn will increase the selling cost of those goods to the public. Let each of us make our public servants, the legislators, realize this.

The Land Yacht

TOURING is not dead, nor will it ever die. As long as there are roads to travel men will seek solace from the tedium of work-a-day commonplace in touring. Touring by rail, however, has severe limitations. One must travel the broad highway and the narrow lane to see the country at its best and to find nature in her most sincere moods. But the touring car also has its limitations, since the problem of eating and sleeping restricts one to the well-traveled ways with their hotels and eating houses. It restricts one to certain hours of travel and deprives one of that privacy which is so desirable in an outing.

Camping bodies and camping trailers for passenger cars are having their day and doubtless have a wide appeal, but there are those who have the means and the desire for greater comfort than these afford. There are those who are content with a small cruiser for their maritime cruises and others who cruise in yachts.

The yachtsman of the land has only recently found his craft. The land-yacht has come. Appointments sufficient to comfortably accommodate a small family in entire independence of hotels and the weather demand a chassis of greater capacity and size than is afforded by the passenger type. The motor truck chassis is, therefore, the vehicle. There are dozens of these outfits now in service. No doubt the future will bring the motor land-yacht as great popularity as the steam and motor yacht of the sea now enjoys.

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German Army Essays a Super-Tank

Armored Car Big and Fast, but Runs on Round Wheels

NEW YORK CITY, Dec. 9—Reports from the Rumanian front current here to-day are to the effect that the Germans are using armored motor cars in their Balkan campaign, which are more deadly than the dreaded British tanks.

From the description it is evident that, so far, the Germans have not attempted to imitate the caterpillar-juggernauts of the English, but have directed their efforts toward lighter and swifter vehicles.

They are described as 25 feet in length, with rubber-tired wheels 12 inches wide. They are said to carry ten men, comprising seven machine gun operators, a driver, a substitute driver and an officer. It is reported to have a 100-horsepower engine, and to have periscopes for observation purposes. A speed of 25 miles per hour is said to have been attained by them.

URGES MOTOR PREPAREDNESS

NEW YORK CITY, Dec. 8—Speaking at a meeting of the National Security League held at the Hotel Astor here, last evening, Frederic R. Coudert, incidental to a plea for universal military training in this country, urged preparatory measures for the use of the tremendous motor vehicle resources of the United States—the greatest in the world.

He described the great extent to which motor trucks and motor buses were aiding each of the European armies, and then pointed to our own lack of proper organization to use the ones we have.

He stated, erroneously it is to be feared, that at the time of the Columbus raid, had the United States one motor truck available, Villa would have been overtaken and captured.

$10,000 FOR FUEL RESEARCH

NEW YORK, Dec. 1—A $10,000 prize for fuel research will be given by the Aero Club. By the will of the late S. H. Valentine, formerly Governor of the Aero Club of America, this sum has been given to the club to establish a prize, or prizes, for the encouragement of air-craft, which shall not use gasoline as a fuel. Mr. Valentine's bequest is expected to stimulate interest in the discovery of a new fuel, lighter than gasoline, which will make longer flights possible.

EXPORT TRUCKS WAIT FOR SHIPS

NEW YORK CITY, Dec. 1—Because no bottoms to carry them to Russia are available, $500,000 worth of motor trucks made in this country are standing on a vacant lot in Long Island City, on Flushing street, near Borden avenue.

MOTOR EXPORT CONFERENCE

NEW YORK CITY, Dec. 8—Some time in January the National Automobile Chamber of Commerce will call a conference of export managers of different members of the organization to discuss means of co-operatively pushing the foreign trade of the American motor vehicle industry.

The conference, it is expected, will help to collect information regarding changes in duties in foreign countries, customs regulations, shipping routes and charges, special permits, lists of dealers, banking arrangements, road conditions and general uses for various types of motor cars, possibilities of interesting agents and broadening markets, the handling of the trade after cars have been sold and such other matters as might be expected to promote sales abroad.

Exports Show Gradual Falling Off

October Saw 1,144 Trucks Worth $3,635,291 Shipped

WASHINGTON, D. C., Dec. 2—Exports of commercial motor vehicles to Europe during October, 1916, amounted to 1,144 trucks, valued at $3,635,291, a loss of 452 vehicles and $671,899 in value compared with the same month of last year.

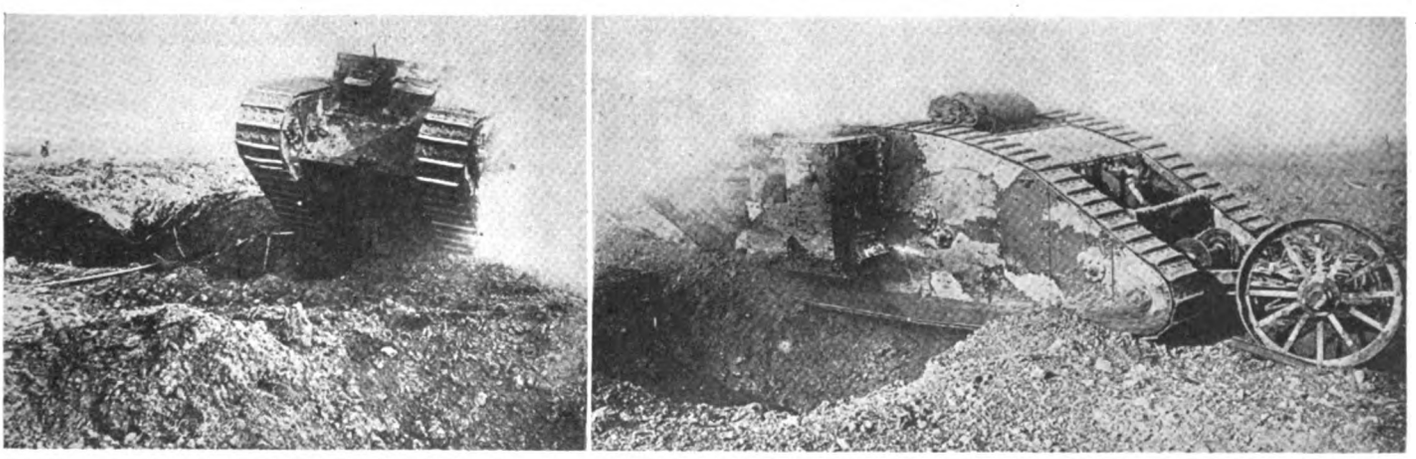
The total for the 10 months of the calendar year is 15,917 vehicles, worth $44,006,346, as against 18,865 trucks valued at $52,076,406 during the corresponding period of last year.

BROOKLYN SHOW IN FEBRUARY

NEW YORK CITY, Dec. 9—Brooklyn's annual motor car show, which ever since the discontinuance of national motor truck shows has been the only exhibition in New York City at which gasoline trucks are on view, will be held February 24 to March 3, 1917, at the Twenty-third Regiment Armory, Brooklyn. Space will be allotted on December 18 at the Motor Club of Brooklyn, 1255 Bedford avenue, Brooklyn. The entire ground floor will be occupied by vehicles this year, accessories being forced to take to the galleries.

TO DISCUSS HIGHWAY ENGINEERING

NEW YORK CITY, Dec. 9—Prominent authorities on highway engineering will present discussions of various phases of the subject at a meeting to be held at the Automobile Club of America, Fifty-fourth street, near Broadway, this city, on the evening of December 28 next. The gathering will be conducted under the auspices of the American Assn. for the Advancement of Science, in collaboration with the Motor Truck Club, the



Two of the first pictures of the new British war tanks in action to reach this country. They were secured by Underwood & Underwood, and show the ponderous vehicle negotiating shell craters with guns firing. It will be noted that the wheels are at the rear, and really have no part in the normal operation of the vehicle, since steering is done by differentiating between the speeds of the caterpillar lag-belts. The odd front formation of the crawlers is what permits them to surmount almost any obstacle to be encountered on a field of battle. This would be impossible with wheels. Those which are used are merely to extend the supported length of the vehicle, so as to bridge trenches instead of having to dip down into them. The tank is said to carry 3-inch guns in addition to machine guns. It moves at a rather rapid infantry rate of speed

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National Highways Assn., the Citizens' Street Traffic Committee of Greater New York and the host, the Automobile Club of America. The meeting will start at 8 p.m. Papers will be as follows:

"The Inter-relations of Seaport, Railroad and Highway Terminals, Calvin Tomkins, New York City.

"Rotary Traffic—Accomplishments and Possibilities," William P. Eno, chairman Citizens' Street Traffic Committee of Greater New York, New York City.

"Speed Governors for Motor Trucks," Theodore Douglas, president Duplex Engine Governor Co., Brooklyn, N. Y.

"Factors Controlling Maximum Overall Dimensions of Motor Trucks," Albert F. Masury, chief engineer, International Motor Co.

"Proper Widths of Road and Pavement Surfaces on State Trunk Highways Subjected to Motor Truck Traffic," Prof. Arthur H. Blanchard, consulting highway engineer, New York City.

"The Most Satisfactory and Economical Pavement for Parkway Drives," Samuel Whitney, civil engineer, New York City.

"Present Status of Preliminary Location and Mapping of National Highways Proposed by the National Highways Assn.," Charles Henry Davis, president, National Highways Assn., Cambridge, Mass.

"Possible Variations of Physical Properties of Rock from One Quarry," Charles P. Berkey, associate professor of geology, Columbia University, New York City.

"Stone and Concrete Foundations from the Standpoint of Efficiency and Economy," George C. Warren, president, Warren Bros. Co., Boston, Mass.

"Present Status of Bituminous Surfaces on Gravel Roads," John R. Rablin, chief engineer, Metropolitan Park Commission, Boston, Mass.

"Value of Physical Tests on Bituminous Aggregates," Prevost Hubbard, chemical engineer, U. S. Office of Public Roads and Rural Engineering, Washington, D. C.

"Proportions of Ingredients of Bituminous Mortars Used as Fillers," Phillip P. Sharples, manager, general Tarvia department, Barrett Mfg. Co., New York City.

"Present Status of Physical Tests for Granite Blocks," C. D. Pollack, consulting engineer, New York City.

"Joint Fillers for Granite Block Pavements," Maurice B. Greenough, consulting engineer, National Paving Brick Mfrs. Assn., Cleveland.

"Recent Developments in Details of Construction of Brick Pavements on Green Concrete Foundations and Sand-Cement Super-Foundations," William C. Perkins, chief engineer, Dunn Wire-Cut Lug Brick Co., Conneaut, Ohio.

"The Causes of Cracks in Cement-Concrete Pavements," A. T. Goldbeck, engineer of tests, U. S. Office of Public Roads and Rural Engineering, Washington, D. C.

"A Condition Survey of Concrete Roads in the United States," A. N. Johnson, consulting engineer, Portland Cement Assn., Chicago.

"The Necessity for Adequate Means of Waterproofing in Road Construction," C. J. Morrison, chief engineer, Meyer, Morrison & Co., New York City.

GOTHAM SERVICE FOR USERS OF CONTINENTAL ENGINES

NEW YORK CITY, Dec. 11—The Chadwick-Delamater Co. has been appointed exclusive repair and replacement agent of the Continental Motor Mfg. Co. for the Metropolitan district. To take care of the new business the Chadwick-Delamater company has moved from its former quarters at 240 West Fifty-third to 159-161 West Twenty-fourth street, New York City, where it has leased a six-story building.

Heretofore users of this make of motor had either to secure their repairs from the agents of the trucks they used or to send to Detroit for them. By the new arrangement skilled mechanics, thoroughly familiar with Continental engines will be ready to render prompt service and a full stock of all repairs will be on hand.

Delivery Conference Now Assured

Program Ready—Husson to Talk on Proper Garaging

NEW YORK CITY, Dec. 4—That the Delivery Conference, slated to take place here on January 8, 9 and 10, 1917, will be a success seems to be assured from the number of replies which the *Dry Goods Economist*, which is promoting the event and will act as host, has received. The tentative program is as follows:

Monday morning—Equipment for and Operation of Internal Delivery Work.

Monday afternoon—Delivery Vehicles and Other Equipment Used in External Delivery Work.

Tuesday morning—Forms and Records Used in Delivery Work.

Tuesday afternoon—Training, Supervision, Promotion, Wages and Bonuses for Delivery Employes.

Wednesday morning — Distributing and Suburban Stations.

Wednesday afternoon—Garages, Garage Systems and Repairs.

Arrangements for speakers are being made, and it is already arranged that Joseph Husson, associate editor, THE COMMERCIAL VEHICLE, shall present a paper on the last-named subject, based on extensive study and observation of garaging conditions in various different lines of trade.

Coming Commercial Vehicle Events

Dec. 19	Newark, N. J., Monthly Meeting of the Motor Truck Club of New Jersey, New Jersey Automobile Club, 22 Washington Place.
Dec. 19	Philadelphia, Pa., Monthly Meeting, Pennsylvania Section, S. A. E.
Dec. 20	New York City, Monthly Meeting of the Motor Truck Club of America, Automobile Club of America, 247 West Fifty-fourth Street.
Dec. 21	New York City, Monthly Meeting, Metropolitan Section, S. A. E., Automobile Club of America.
Dec. 28	New York City, Highway Engineering Conference, American Assn. for the Advancement of Science, Automobile Club of America.
1917	
Jan. 9	New York City, National Automobile Chamber of Commerce, Annual Banquet, Waldorf - Astoria Hotel.
Jan. 10	New York City, Annual Banquet, M. A. M., Waldorf-Astoria Hotel.
Jan.	New York City, Export Conference, N. A. C. C., Transit Building.
Jan. 8-10	New York City, Delivery Conference. *Dry Goods Economist*, Thirty-ninth Street Building.
Jan. 9-11	New York City, Annual Winter Meeting, Society of Automobile Engineers, Engineering Societies' Building.
Jan. 11	New York City, Annual Banquet, S. A. E., Hotel Biltmore.
Jan. 13-20	Montreal, Que., Can., Montreal Motor Show.
Feb	Newark, N. J., Passenger Car and Motor Truck Show, First Regiment Armory.
Feb. 3-10	Minneapolis, Minn., Tenth Annual Auto Show.
March 3-10	Boston, Mass., Fifteenth Annual Motor Vehicle Show, Mechanics' Building.

ALL SET FOR S. A. E. MEETING

NEW YORK CITY, Dec. 2—Arrangements are now completed for the annual meeting of the Society of Automobile Engineers, to be held in New York Tuesday, Wednesday and Thursday, January 9, 10 and 11.

The two first days will be devoted to committee meetings, particularly that of the Standards Committee, and the professional sessions, usually consuming 3 days, will be condensed into 1 day, Thursday. At this meeting only abstracts of the papers will be read, each member being provided with full copies of all papers. This session will be divided by a recess for luncheon which will be served in the lobby adjoining the meeting room at the Enginering Societies' Building. It will end at 4:30 p.m.

That evening the annual banquet will be held in the banquet hall of the Hotel Biltmore, followed at midnight by attendance at the Ziegfeld Midnight Frolic atop the New Amsterdam Theater. The entire accommodation for that night has been taken for the exclusive use of S. A. E. members.

CHASE TO HELP CLARKSON

NEW YORK CITY, Dec. 9—Herbert Chase, chief engineer of the Automobile Club of America for a number of years, has been made assistant secretary of the Society of Automobile Engineers. His headquarters will in future be the society's rooms at 29 west Thirty-ninth street.

TRUCK EXODUS, CAMBRIDGE TO BOSTON

BOSTON, MASS., Dec. 9—Boston is now developing a commercial vehicle section on Commonwealth Avenue. The Signal Motor Truck Co. of New England threw open its new building to-day on that street. Frederic C. Henderson, formerly one of the Henderson Bros. firm of Cambridge, builders of carriages, wagons, etc., and now body and truck builders, has the Signal and Atlas trucks there. He gave a banquet at one of the hotels this evening to a number of his friends and his sales force.

A short distance away on the other side the G. M. C. company is going back into the first structure erected for motor vehicles in that territory, and which was built originally for the company. That was ten years ago. The G. M. C. company was later taken down town and a lease given to the Wentworth-Fosdick Co. That company has dissolved, and Mr. Wentworth gave up the lease a few weeks ago, so the G. M. C. company is now refurnishing its old home. The White company has its big sales and service room for cars and trucks next door, and this is being enlarged. And the next building to the White is the Kisselkar with a big service and salesroom for the trucks and cars of that line. The big Garford structure just finished is also nearby, while further down the avenue the General Vehicle Co. has leased a new building, and the Velie Co. of New England has just moved in, where it can handle its truck and car trade to better advantage.

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Bethlehem Trucks to Be Ready Soon

Two Models to Be Built at New Allentown Factory

NEW YORK CITY, Dec. 12—Two models of trucks, of 1¼ and 2 tons capacity, will be marketed about next February by the Bethlehem Motors Corp., Allentown, Pa. A new plant which when completed will have a floor space of approximately 199,000 square feet is being built. The concern has a capital of $6,000,000, made up of $1,000,000 preferred, paid in, and $5,000,000 common. The preferred is all held by the four men who head the concern.

Arthur T. Murray, formerly of the Brady-Murray Motors Corp., heads the concern as president. Associated, besides Allentown and Bethlehem capitalists, with Mr. Murray is W. S. Stevenson, formerly sales manager of the old Mack Bros. Motor Truck Co., who will be sales manager of the Bethlehem company. D. G. Dery, a silk manufacturer, is vice-president.

A large production is planned for the first year and the vehicle will have nothing radical in its design.

DORRIS DROPS ¼-TONNER

ST. LOUIS, Mo., Dec. 2—The Dorris Motor Car Co. has discontinued the manufacture of its 1,500-pound delivery car. No reason is given for the move.

CHRISTIAN GIRL HEADS STANWELD-PERFECTION MERGER

CLEVELAND, Dec. 8—Christian Girl has assumed the presidency of the new Standard Motor Parts Co., the new concern formed by the combination of the Standard Welding Co. and the Perfection Spring Co. The two plants will be operated about as before, but the Perfection plant will be known as the Spring Department and the Stanweld plant as the Rim and Tube Department.

Other officers of the new concern are: F. W. Prentiss, first vice president; E. W. Farr, second vice president; T. E. Borton, treasurer. C. C. Bolton and Arnold S. Goss, together with the officers above, will constitute the board of directors. P. A. Connolly is secretary, but not a director.

OVERLAND HELP GETS RAISE

TOLEDO, Dec. 8—Increases in the wages of 21,000 employes of the Willys-Overland Co. at the Toledo and Elyria, O., plants have just been made. These increases aggregate $1,250,000 a year.

CADILLAC WANTS NAME MONOPOLY

DETROIT, Dec. 9—Claiming that the use of the name Cadillac by the manufacturer of the Cadillac truck, the Cadillac Auto Truck Co. is hurting its business, the Cadillac Motor Car Co., Detroit, is suing for an injunction to restrain the truck concern from the use of the name.

The Cadillac Motor Car Co. has prior use in its favor, since it has been manufacturing motor cars since 1905 under its present name. The Cadillac Auto Truck Co., however, gets its name legitimately, being located in Cadillac, Mich. The firm was formed from local capital and employed the name of the town in order to identify the venture with it. The name Cadillac Auto Truck Co. was chosen in preference to Cadillac Motor Truck Co. in order to distinguish it from the Cadillac Motor Car Co., and the product was named Acme instead of Cadillac in order to further avoid confusion.

The Cadillac Motor Car Co. has never been identified with the commercial vehicle industry.

AUTOCAR DECLARES DIVIDEND

PHILADELPHIA, PA., Dec. 9—A dividend of $7.50 per share has been declared by the board of directors of the Autocar Co., Ardmore, Pa. This dividend is payable December 20 to stockholders of record December 1, 1916.

DIE CASTING CONCERNS JOINED

SYRACUSE, N. Y., Dec. 6—Consolidation of the Van Wagner Die Casting Corp., formerly the E. B. Van Wagner Mfg. Co, with the Precision Die Casting Co. has been effected by the purchase of the properties from Mr. Van Wagner by a new corporation known as the Precision Die Casting Co. The change brings new blood into the business and more capital. Improvements and enlargements are to be made and the business will be pushed vigorously.

T. G. Meacham, vice-president and general manager of the New Process Gear Co., is president of the new concern; J. W. Knapp, treasurer of the Van Wagner company, is vice president; H. S. Tenny, secretary of the Syracuse Trust Co., is treasurer; E. J. Quintal of the accounting firm of Farrell, Sehl & Quintall is secretary, and A. P. Bellinger of the Solvay Process Co., G. W. Bowen of the G. W. Bowen Mfg. Co. of Auburn and W. A. Ball of the Semet Solvay Co., in addition to the officers, are the directors.

GOODYEAR HAS BEST YEAR

AKRON, O., Dec. 5—A business increase of 80 per cent was revealed at the annual meeting of the Goodyear Tire & Rubber Co., held in the general offices of the company here on December 4. That this increase—from $36,000,000 in 1915 to $63,000,000 in 1916, both computed for the fiscal years—was based on domestic and peaceful export business was a point of especial interest. That this great growth in gross business was accompanied by a substantial gain in profits is shown by the increase in net profit from $5,000,000 to $7,000,000 over the same period.

Officers were re-elected as follows:

F. A. Seiberling, president; C. W. Seiberling, vice president; G. M. Stadelman, vice president and sales manager; P. W. Litchfield, vice president and factory manager; A. F. Osterloh, secretary; F. H. Adams, treasurer; W. E. Palmer, assistant secretary and assistant treasurer, and H. J. Blackburn, second assistant treasurer.

All of the directors were re-elected, as follows:

F. A. Seiberling, C. W. Seiberling, G. M. Stadelman, F. H. Adams, P. W. Litchfield, H. B. Manton and J. P. Loomis.

Reo Earns 4 Million in Fiscal Year

Fiscal Year Report Shows Big Increase in Assets

LANSING, MICH., Dec. 1—The net earnings of the Reo Motor Car Co. and the Reo Motor Truck Co. for the year ending August 31, 1916, were $4,031,070.26. Current assets were reported as amounting to $7,610,501, with a surplus of $3,849,828.20. Total assets are $11,978,307.98, capital assets amount to $4,277,674.06, and current liabilities are $1,191,229.78. This strong financial position is stated in a balance sheet at the close of business August 31, 1916.

The current assets show an increase of $2,776,845.36, as compared with the current assets of $4,833,655.75 on August 31, 1915. Other important items mentioned in the report are certificates of deposit of $320,000, cash on hand in banks $1,360,517.97, and inventories of finished product, supplies and materials on hand amounting to $4,904,511.23.

NEW PIERCE DIRECTORATE

BUFFALO, Dec. 5—The transfer of the Pierce-Arrow property from the present company to the Pierce-Arrow Motor Car Corp. will be made to-morrow, when the new organization takes hold, under the presidency of Colonel Charles Clifton.

It is proposed to make the following persons directors of the new organizations: Charles Clifton, president; Henry May, vice president; W. J. Foss, Buffalo; J. F. Alvord, president of the Torrington Co.; W. S. Cox, of J. & W. Seligman & Co.; C. J. Schmidlapp, vice president of the Chase National Bank; J. G. Dudley, of Buffalo; Albert Strauss, of J. & W. Seligman & Co., and C. H. McCullough, vice-president and general manager of the Lackawanna Steel Co., Buffalo.

The company was recently chartered in this state under the name of the Pierce-Arrow Motor Car & Truck Co., with 350,000 shares of capital stock, 100,000 shares of preferred, par $100, and 250,000 shares of common with no par value. The incorporators were L. D. Adkins, R. J. Trimble and E. S. Hemphill.

HORNER TRUCK STOCK ISSUED

DETROIT, Dec. 1—The Detroit-Wyandotte Motor Truck Co. is selling its unissued treasury stock for the purpose of securing a larger working capital. The concern is going into foreign markets and is making shipments to Porto Rico and Cuba.

GARY DOUBLES CAPITAL

SOUTH BEND, IND., Dec. 2—The Gary Motor Truck Co., Gary, Ind., has increased its capital stock from $25,000 to $50,000.

MACK TRUCK PRICES RAISED

NEW YORK CITY, Dec. 8—The International Motor Co., this city, will advance its list prices on the Mack truck Jan. 1, as follows: 1 ton, $2,000 to $2,150; 1½ ton, $2,350 to $2,500; 2 ton, $2,700 to $2,800; 3½ ton, $3,400 to $3,650; 5½ ton, $4,000 to $4,250; and 7½ ton, $4,500 to $4,600.

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Canadian Truck Tax $25 per Ton

Larger Trucks Than 3-Tonners Confined to Cities

QUEBEC, P. Q., Dec. 2—Some concessions were made by the government this week in regard to the motor vehicle bill, after strong representations had been made by an influential delegation of motor men from Montreal, the Eastern Townships and Quebec. The delegation was received by Sir Lomer Gouin, Hon. Walter Mitchell and Hon. Jermie Decarie, the other ministers being engaged in debates going on in the House at the time. The government agreed to limit the charge for motor trucks to $75 per year as a maximum, and to prohibit trucks of more than 3 tons, except in the cities of Montreal and Quebec. The government consequently maintains its first aim of charging $25 per ton capacity for motor trucks, and prohibits those of other tonnage, practically taking the position that there are very few such trucks.

The proposed law was digested in the last issue of THE COMMERCIAL VEHICLE.

The truck people were quite willing to submit to increases. What they complained of was that the increases were altogether too drastic. George J. Sheppard, president of the Montreal Automobile Trade Assn. and manager for Canada for the Canadian Pneumatic Tool Co., Canadian representative of the Lithe Giant truck, who was the speaker of importance for the delegation, pointed out the danger that the heavy increases would mean that the province would not benefit by the installation of automobile plants, which had been contemplated. This was responsible for the government concession in motor trucks. Among others present were T. C. Kirby, manager of the association; W. Jenning, vice-president; R. F. Girdwood, the treasurer, and Bese & Prim, directors, and E. I. Taylor, president of the Eastern Townships Automobile Trade Assn. Frank Carroll, president of the Quebec Automobile Club, was also present.

Mr. Sheppard suggested that the rate for a 3-ton motor truck, 30 hp., should be $33.75, instead of $75, the present rate was $15, and on an 8-ton truck the rate be $58.75. The increases proposed by the government on motor cars would be from 25 to 124 per cent increase, and on motor trucks would be 130 to 500 per cent, and this would mean a very serious handicap to development of the industry. He pointed out that in France the system of determining horsepower was different to what it was here, and the comparisons could not be made. The rates proposed, said he, were far in excess of what other provinces were charging, and ahead of those in the United States. If the government carried it through it would mean a serious drawback to the development of the trade, owing to the heavy duties on cars and the late increase in the tariff. American concerns had been seriously considering spending a great deal of capital here. He, himself, represented a concern with $11,000,000 capital and had advised the establishment of a plant here, but if the proposed law went through he would have to change his advice.

In this province motor cars were used only 8 months a year, but the licenses were for all the year. He understood that revenue for roads was needed, but it should not all come from the industries. It was not the motorists who destroyed the roads, but farmers with rigs that drove ruts through them. He suggested as what was considered a fair increase that there should be a general increase on the present rates on all motor traffic of 25 per cent and an additional $5.00 per ton capacity for motor trucks.

Mr. Mitchell said he was informed motor trucks in Montreal were of 3-ton capacity, and only a few higher, and he did not agree with what Mr. Sheppard said in regard to these trucks not cutting up the roads, and $75 per truck was not too high for a 3-ton truck. In regard to motor cars, these destroyed the highways in proportion to their speed and power, and the tax was charging those who were best able to stand the increase. It was necessary to keep up the roads if the fifteen or sixteen million dollars spent on roads was not wasted. The whole cost was not being put on the vehicle, but the government had no jurisdiction over rigs. The government felt, said Mr. Mitchell, that the increased tax would help the motor trade, for it would mean better roads, and this would induce people to buy cars as against a consideration of a few dollars additional license fee. He then suggested limiting motor trucks to 3 tons, except in Montreal and Quebec, and this was agreed to by Mr. Sheppard.

The delegation asked that officers be made to carry and show badges when holding up motorists. Consideration was promised. Mr. Carrell then asked that the speed limit be increased to 20 miles in the city and 30 miles in the country places, instead of 16 and 25 miles respectively. Mr. Mitchell pointed out that motorists were never arrested for getting a few miles beyond the speed, and said that he wished to dissipate that idea in the minds of motorists that the government was persecuting them. The amount the government received from fines barely balanced the cost of capturing and punishing the violators of the law. Mr. Carrell also wanted the speed going around corners to be increased from 4 to 9 miles. These suggestions as to the increased speed were not favorably received, nor did Mr. Carrell have any better success when he suggested the government drop the clause making motorists slow down to 10 miles when passing each other. The government promised to give the matter of lawyers' fees in cases against motorists consideration.

PEARCE-ARROW, NEW TIRE

GERMANTOWN, PA., Dec. 8 — The Pearce-Arrow Tire and Rubber Co., this city, is introducing a new patented puncture-proof pneumatic tire with a guarantee of 5000 miles. The new tire, it is stated, has shown itself to be not only puncture-proof, but blow-out-proof as well.

Another feature claimed for the tire is that it does not heat up when in use on the road to anything like the degree noted in other tires. This is accomplished by a secret process of manufacture and treatment of materials which eliminates friction.

Second New York Fee Plea Dec. 18

Final Hearing to Be Held in New York City Later

NEW YORK CITY, Dec. 13—Monday, December 18, 11 a.m., at the State Capitol in Albany, is the date, time and place of the second public hearing to be held by the New York State Commission to formulate a new schedule of motor truck and bus fees based upon the extent of their use of state roads and the damage done thereto.

The first hearing was held at the same place on November 21 last, at which the commission simply heard suggestions from those interested. Nothing definite on the commission's plans was given out at that time. It is expected that something more tangible will be forthcoming at the second hearing.

It is also expected that the date of a third public hearing to be held in New York City will be announced by the commission on December 18.

As reported in THE COMMERCIAL VEHICLE of December 1, the new schedule of fees must be filed with the secretary of state not later than January 1, 1917, and is to go into effect on February 1, 1917.

FIRE AND POLICE HORSES GO

NEW YORK CITY, Dec. 8—Both fire and police horses are to be eliminated by the City of New York. The only further use that the police department will have for horses will be as saddle animals for the mounted police. All fire apparatus and police patrols are to be motored at once.

TRUCKS TO OUST MAIL TUBES?

WASHINGTON, D. C., Dec. 8—The substitution of motor trucks for pneumatic mail tubes in every city except New York is urged in the annual report of Postmaster General Burleson.

NON-RECIPROCITY RULED LEGAL

WASHINGTON, D. C., Dec. 4—Any state, according to a ruling handed down by the United States Supreme Court to-day, may require non-residents to take out licenses for the operation of motor vehicles within its borders. The decision was rendered in the case of F. J. Kane vs. the State of New Jersey. The state arrested Mr. Kane for operating a motor vehicle in New Jersey without complying with three provisions of the law, requiring non-residents to register their vehicles in the state, to pay a tax for the use of the roads and to vest in the secretary of state the power of attorney.

The decision is of widespread importance, for under it it might be possible for all of the states to make similar requirements to those in New Jersey, so that a tourist going through a dozen states would have to register his vehicle twelve times, pay twelve times the normal tax and possibly be bothered with a dozen different number plates.

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Motor Trucking Centers of America—III

BOSTON AND SPRINGFIELD

New England's Gateway in Midst of Thickly-populated Area Which Demands Trucks for Quick Communication

BOSTON, MASS., Nov. 17.—Boston, the gateway of Massachusetts and the hub of all New England, is not herself a large user of motor trucks because her streets in the business section are narrow, poorly paved and very much congested. Of Massachusetts's 17,000 odd commercial vehicles, approximately only 4,000 are maintained in Boston, or a percentage of about 23. Compared with New York City, she is far behind, for of the Empire State's 33,000 motor trucks, approximately 14,000, or 42 per cent, are engaged in the work of the metropolis.

Notwithstanding this apparent poor showing, Boston is nevertheless a very important truck center, paradoxical as it may seem. This is due to her geographical location at the very heart of all New England. Within a radius of 75 miles from the Hub are most of the largest cities of Massachusetts, Rhode Island and New Hampshire. All of these are within 1 day's motor truck run of Boston.

Boston Heart of New England Industry

Boston is the center to which strings lead. The great textile beehives of Massachusetts, Rhode Island, Connecticut and New Hampshire are all within the 75-mile circle drawn about Boston as a pivot. The center of the boot and shoe industry, the greatest in the world, is at Boston's back door. Similarly, the hearts of the hat industry, the hardware center and the paper mills of Maine, western Massachusetts and Connecticut, are within a day's motor truck run out and another back. With Boston as a center, all of New England is accessible by motor truck. In fact, the motor truck offers the quickest and cheapest method of bringing all these throbbing manufacturing cities to Boston's doorsteps.

Aside from the great industrial institutions within a day's run from Boston, the population within a radius of 50 miles of Boston's City Hall represents one-fifteenth of the purchasing power of the country. Although Boston had only 686,092 inhabitants in 1910, according to the census of that year, Metropolitan Boston, comprised of the many small cities that bound Boston proper, each with its own civic government, has a population of 1,423,429. Within a radius of 25 miles of the center of Boston there are 2,038,123 souls and within the 50-mile circle 3,470,587. The number of people within this 50-mile circle drawn about Boston is second only to that in an equal area about New York, and is ahead of Philadelphia, Chicago and St. Louis, in the order given.

This congested population and the great number of manufacturing centers has resulted in the necessity of much inter-city haulage. This in turn has resulted in good roads. Good roads in their turn have permitted the economical use of motor trucks.

The recent freight embargo along the Atlantic seaboard has proven a great impetus for the increase of commercial vehicles in inter-city and overland haulage. Motor trucks are now hauling goods between Boston and Waltham, Peabody, Lynn, Marlboro, Framingham, Brockton and Milford, all within a 25-mile radius. Motor trucks are even in service between Boston and such important points as Attleboro, Taunton and Fall River, the latter almost 50 miles from the metropolis.

Besides these direct runs, thousands of trucks are in service between the nearby cities carrying all sorts of goods, raw stuffs and manufactured products. In every case they are delivering these goods in much less time than it would take to ship by railroads, for the reason that the delays incident to short-haul freight shipments are eliminated and the goods delivered direct to the purchaser without the necessity of hauls at both ends of the routes.

Bay State Trucks Treble in 4 Years

The great savings effected in the use of trucks in such work is best shown by the tremendous growth of commercial vehicles in Massachusetts during the past four years, for naturally they would not have trebled in that period were they not rendering a service better than that which could be had in any other way. The increase in the Bay State's commercial vehicles is best shown by the following tabulation:

January 1, 1914	5,948
January 1, 1915	8,236
January 1, 1916	11,960
To October 1, 1916	17,026

A large proportion of these trucks haul goods into and out of Boston, although they are not registered in Boston, and therefore are not shown in the city's registrations, but rather in the figures of some of the nearby industrial centers.

All roads lead to Boston. It is not an uncommon sight to pass 100 trucks in one day along these roads radiating from the Hub. Some are Boston-owned trucks delivering goods which was formerly shipped to the suburban territory by railroad express and eventually delivered by horse wagons. Others are vehicles delivering goods direct from some large industrial city to the consumers in Boston, and still others are transporting material between cities at some short distances from the metropolis.

Perhaps one of the best examples of the first-mentioned class of work is that of the Clearing House Parcel Delivery Co., which maintains a fleet of fifty commercial vehicles to deliver packages from 150 Boston department stores, drug stores and shoe stores to points within a 12-mile radius from the city. The plan of operation of the Clearing House concern was fully described and illustrated in the Dec. 1, 1916, issue of THE COMMERCIAL VEHICLE.

Industrial Plants Use Trucks

Many of the large manufacturing plants just outside of Boston deliver their goods, such as boots and shoes, hides, textiles, etc., to the Boston market by motor trucks. Dressed beef and green goods are also being delivered to the Hub to a greater extent each year by motor trucks.

Due to Boston's large suburban population, the largest in the country in proportion to the number who work within the city limits, there are many express companies which deliver goods from many stores at pound or package rates. The success of such concerns is based upon the fact that any one Boston store has to deliver comparatively small loads in various of the suburban areas and that these deliveries require fairly long hauls, sometimes with much less than capacity loads. Such conditions make the cost of motor delivery high and offer an opportunity to a concern delivering goods for a number of companies, in this way obtaining full or almost full loads on each trip. While there are still many such concerns in existence in Bos-

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ton, there seems to be a tendency on the part of merchants generally to install their own motor equipment and to obtain sufficient business in any one locality to make their own trucks pay.

Boston Fifth World Port

Besides the great amount of goods shipped by motor truck into the Boston district for home consumption or manufacture and the large volume of finished products shipped out, there is still a larger amount which must be handled in passing through the city from the points of origin to other points throughout the country or for export. Boston is the fifth largest port in the world and the second largest in North or South America in the net registered tonnage passing through its harbor. Boston is also 1 day's sail nearer Europe than any other large Atlantic port. Its shipping increased 757,189 tons, or 5 per cent, from 1912 to 1913, and its foreign trade $39,644,729, or over 13 per cent, in the same period.

The Hub's principal exports are cotton and its allied products, leather and its manufactured products such as boots and shoes and leather goods in general, meats and dairy products, iron and steel and live stock.

Boston leads the world in its imports of hides and skins, with $19,846,880 in 1913, not including almost two million domestic cattle, sheep and hogs received for slaughter. As a wool market, Boston is second only to Liverpool.

The total gross tonnage of Boston's foreign shipping trade amounted to 4,929,780 in 1912. In addition to this she handled almost three times as much coastwise shipping, or 12,258,030 tons, during the same year.

While most of the foreign tonnage is transferred direct from the railroad freight yards to the wharves by box cars shuttled through the Boston streets by steam locomotives at night, the great majority of the coastwise shipments are trundled over the narrow city streets by horse drays.

Motor trucks are not used to any great extent in the haulage of this vast volume of coastwise tonnage to the docks because of two reasons. First, there are rigid restrictions against the use of trucks on the piers, particularly gasoline vehicles. In the second place, the methods of receipt and the delivery of consignments at the wharves are so antiquated and slow that the delays encountered in the average run of a day's work of a truck in such service eat up all the profit in its operation. Aside from these facts, practically all the freight yards, the wool warehouses and the coastwise docks are within a square ½ mile on a side in which the streets are narrow and paved with cobble stones. These conditions result in much vehicular congestion and the rough pavement is hard on truck tires and mechanism.

Boston Dock Conditions Poor

For all of these reasons, there is little desire on the part of Boston's merchants to use trucks in the coastwise shipping traffic. These conditions have been somewhat bettered during the past year by the increased use of electric trucks in Boston, due to the establishment of the battery-exchange system as installed by the General Vehicle Co., and described in the Nov. 1, 1916, issue of THE COMMERCIAL VEHICLE. The ban on trucks at the wharves does not apply to electric vehicles and there are a few more such now in the work. The delays at the piers still exist, but these do not affect the electric truck to the same extent as they do the gasoline vehicle because of the former's lower operating expenses. However, the motor truck of any type will not come into its own in this work until the conditions on the piers are changed radically and brought up to date.

Springfield Trucks Increasing

Has One Truck to Every 157 Persons

SPRINGFIELD, MASS., Nov. 17.—Progressive is the one word which describes Springfield best. With a population of but 110,000, it is run like a city of double the number of inhabitants. Fiftieth in the rank of cities with a population of 89,000 in the census of 1910, it is estimated that Springfield has moved up to about the thirty-fifth city in point of population.

Growing faster than the United States, Springfield has doubled its population in less than 20 years. It now has 700 commercial vehicles. These have more than doubled in the last 5 years. With Springfield's present population of 110,000, it boasts of one commercial vehicle to every 157 persons. In this respect she stands far ahead of the great metropolis of New York, which has one commercial vehicle for every 357 inhabitants.

Unlike Bridgeport, Conn., and many other cities of New England in which large amounts of war materials have been manufactured, the growth of Springfield's population and the increase in its number of motor trucks have not been due to the war, but rather to the progressiveness of its inhabitants.

Springfield's progressiveness is made patent in many ways. For example, its fire department is horseless. That its fire-fighting organization is most modern and most efficient is borne out by the fact that the city has one of the lowest fire insurance rates in New England.

Civic Institutions Denote Progressiveness

A city's progressiveness can generally be accurately judged by its civic institutions. In these Springfield stands pre-eminent for a city with a population of 110,000. It possesses one of the finest groups of municipal buildings in America, including an auditorium seating 4,000, whose acoustics are pronounced the best in the world. The loss of Springfield's city hall by fire in 1905 proved a blessing in disguise in that it enabled the old building, which had been entirely outgrown by the needs of the city, to be replaced by a new civic group sufficient to meet the requirements of the municipality for a generation to come.

Springfield also boasts of a civic art center consisting of the city library, art museum and science museum, which is especially large for a city of its size.

Springfield's civic progressiveness is also measured by its public school system, which is one of the best in the United States. The school houses are of the most modern type and are fitted with the latest word in educational equipment. The system requires a budget of approximately $900,000 yearly.

Springfield as an educational center takes unique rank among the cities of the country, having within a radius of 100 miles twenty-five colleges and universities with a total enrollment of nearly 25,000 students.

Next to Boston in Finances

Springfield is one of the foremost cities in New England in postal mail service, third in the number of telephones in use, and, of the Massachusetts cities, second only to Boston in financial importance. Its seven national banks and trust companies, with a combined capital of $3,250,000, have a surplus and undivided profit of $4,218,000 and deposits of $28,000,000. Its three savings banks have deposits of $50,000,000 and have paid out to depositors $36,000,0000 since organization. The 1915 bank clearings amounted to $153,000,000.

One of the most ambitious community enterprises indicative of Springfield's progressiveness was the organization of the Eastern States Agricultural and Industrial Exposition for the purpose of co-ordinating the agricultural and commercial interests of New England. The plan includes the erection of twelve permanent buildings on 200 acres in West Springfield. The structures have a total floor area of 500,000 sq. ft. and will be used for the exhibition of dairy live stock, allied machinery and for other exhibition purposes. The National Dairy Show, the most important gathering of the dairy interests of America, met this year in Springfield, the first time the convention has ever been held outside of Chicago.

Has 151 Miles of Improved Roads

The mileage of improved streets is also indicative of a city's progressiveness. Springfield, with a breadth of 5.9 miles and a length of 8.9 miles, has approximately 151 miles of improved streets, divided as follows:

	Miles
Waterbound macadam	58.56
Bituminous macadam	22.72
Bituminous concrete	6.18
Tar top	3.38
Granite block on sand cushion	2.01
Glutrin-bound macadam	.31
Rocmac, a patented surface	.17
Total, surfaced roads	93.33
Gravel roads	49.71
Dirt roads	7.95
Total	150.99

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Springfield is located on the northeast bank of the Connecticut River and is built upon the slopes leading up from the river bed to the flat ground beyond. It is a natural industrial center, being the terminus of the New York, New Haven & Hartford Railroad, the Connecticut River Division of the Boston & Maine Railroad and the half-way station of the Boston & Albany Railroad. It is approximately the same distance from New York, Albany and Boston. For this reason it is the railroad center for western New England, having the best of rail connections with all points north, south, east and west. One hundred and ninety-eight trains arrive and depart daily.

Although Springfield contains many manufacturing institutions, due to its exceptional railway connections to points in all directions, it is known as the City of Homes. Even from its earliest days it has boasted of an unusual number of private residences, and while apartment houses are now being built, it still shows a strong predilection for the individual home. Three-family houses have been discouraged in Springfield and a city ordinance now prohibits such structures from being built. The private residences of Springfield's inhabitants are located on the outskirts of the city. This has resulted in a large increase in the number of light, speedy delivery vehicles, as will be pointed out later.

Springfield has 200 different industries with an invested capital of $40,000,000, output of $50,000,000, consuming $20,000,000 in raw material, employing 28,000 men and 7,000 women and an annual payroll of $20,000,000.

Industrial Activities

Perhaps the best known of Springfield's industrial plants is the United States Government arsenal and armory, established in 1795 and producing the Springfield army rifle. The establishment of the armory made Springfield at once a center for skilled labor, which has had a marked influence on its industrial development. Other Springfield products include motorcycles, motor trucks, revolvers, skates, railway cars, motor vehicle tires, valves, all sorts of tools, magnetos, candy machinery, paper goods and dictionaries. The Hendee Mfg. Co., maker of the Indian motorcycle, maintains one of the largest industrial plants in the city. It is also the home of Knox tractors, made by the Knox Motors Co. Smith & Wesson, makers of revolvers, and G. & C. Merriam & Co., publisher of the Webster dictionary, also maintain large plants, as does the Bosch Magneto Co.

With all of Springfield's progressiveness, as told in its civic institutions, it is but natural that its inhabitants should be quick to take advantage of the benefits of the progressive method of road transportation by motor vehicles instead of horse wagons.

Retail Delivery Conditions

The homes of Springfield's workers on the outskirts of the city have made delivery routes longer, and it is in this delivery of the necessities of life, such as food and clothing, that the great bulk of the motor trucks are used. The representative of THE COMMERCIAL VEHICLE who visited Springfield found that almost half, or 300, of the 700 trucks in use are converted passenger vehicles, most of them Fords with delivery bodies. This would tend to indicate the suitability of the Ford as a light-capacity delivery vehicle or the absence of a similar vehicle designed primarily for delivery purposes which can be purchased at a price anywhere near that of the Ford.

These vehicles deliver their goods mostly within a radius of 5 miles, which includes the cities or towns of Chicopee Falls, Merrick, Agawam, Mittineague, Brightwood, Longmeadow and Athol Junction. Holyoke, a city of about 60,000 souls, is about 8 miles from Springfield on the north.

Holyoke merchants deliver a considerable amount of their goods by motor in the suburbs between it and Springfield. Some few of the large department and grocery stores in Springfield have patrons in Holyoke, due to the better assortment offered in the former city.

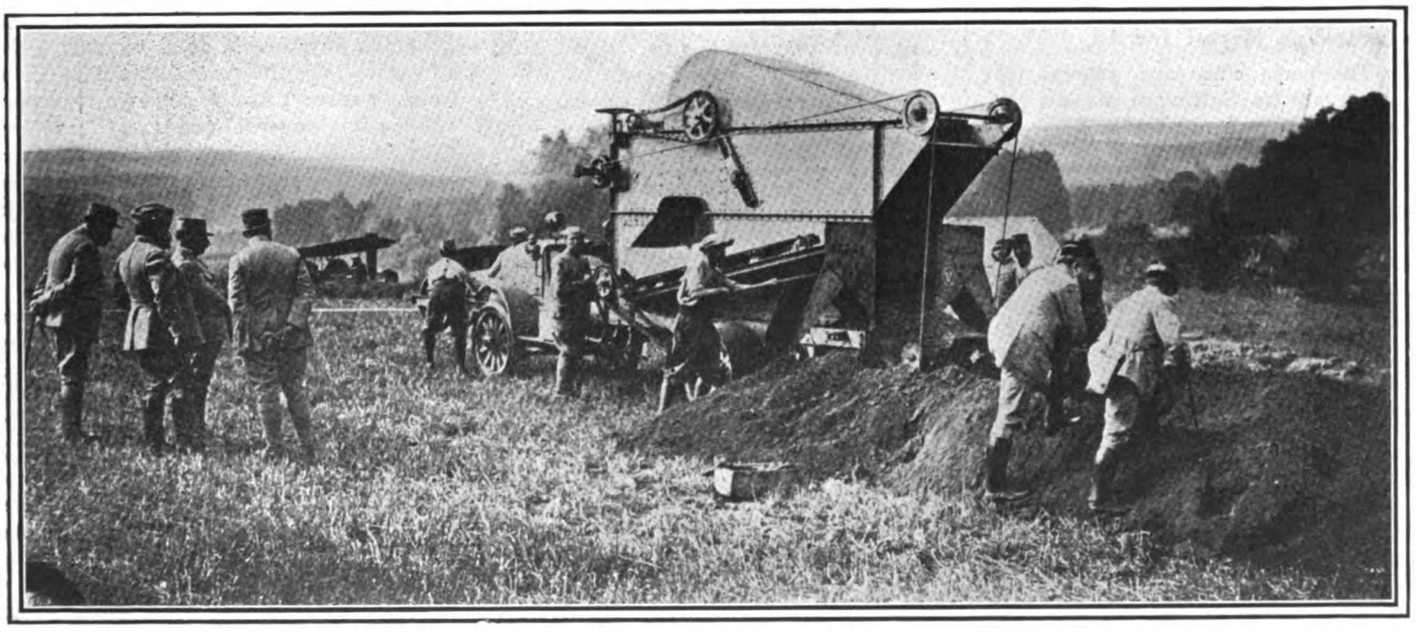
While Springfield itself is fairly level, excepting for the slopes leading down to the Connecticut River, the country to the north and northwest is hilly where it joins with the Holyoke range of hills running north and south to the west of the city. This hilly and rolling country has had its effect in increasing the use of motor delivery vehicles instead of horse wagons, the former being able to negotiate the hills much more easily than the horse wagons.

The roads within the 10-mile circle drawn about Springfield as a center are mostly improved and kept in fair shape so that the motor delivery vehicles are able to make use of their greater ground-covering capabilities without undue strain on the mechanism.

Most of Springfield's manufacturing plants are located outside of the city center and have direct railroad sidings for shipping carload lots. Such cars must be shuttled to the main freight yards before being made up into trains. This transference takes considerable time, so that for quick shipment of goods, especially l. c. l. shipments, many manufacturers use motor trucks to haul their goods direct to the main freight yards.

Due to the scattered individual homes of Springfield's inhabitants, her coal and ice merchants are using motor trucks to a greater extent each year because of their ability to cover larger territories than formerly served with horse wagons.

Materials such as sand, cement and lumber for building operations are being delivered by motors because of their dependability and the demand of the builders that such material be delivered as it is needed and not too far in advance so as to be damaged by the weather.



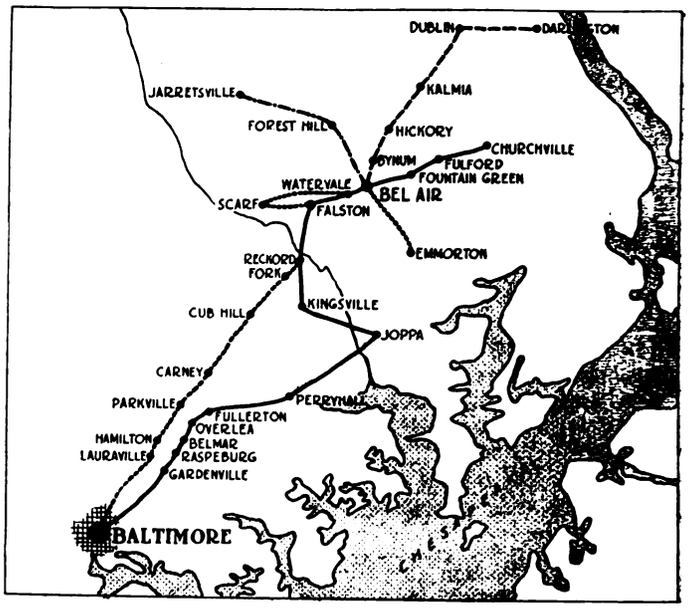
A new type of trench-digging machine mounted on a motor truck chassis as used by the French Army along the Somme front. As shown above, the truck is of the conventional type except that it has wide steel-tired wheels at the rear. The digging mechanism consists of steel buckets attached to an endless belt which carries the excavated material up into the body proper from where it is deposited on the ground on either side through trough-like chutes. If desired, the excavated material can be deposited on one side of the trench, thus forming an admirable breastwork

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Motor Freight Line Successful 3 Years

Regular Schedules from Maryland Towns to Markets in Baltimore

By Raymond Allen



Baltimore and Harford counties, Maryland, the territory served by the four Baltimore and Belair truck routes

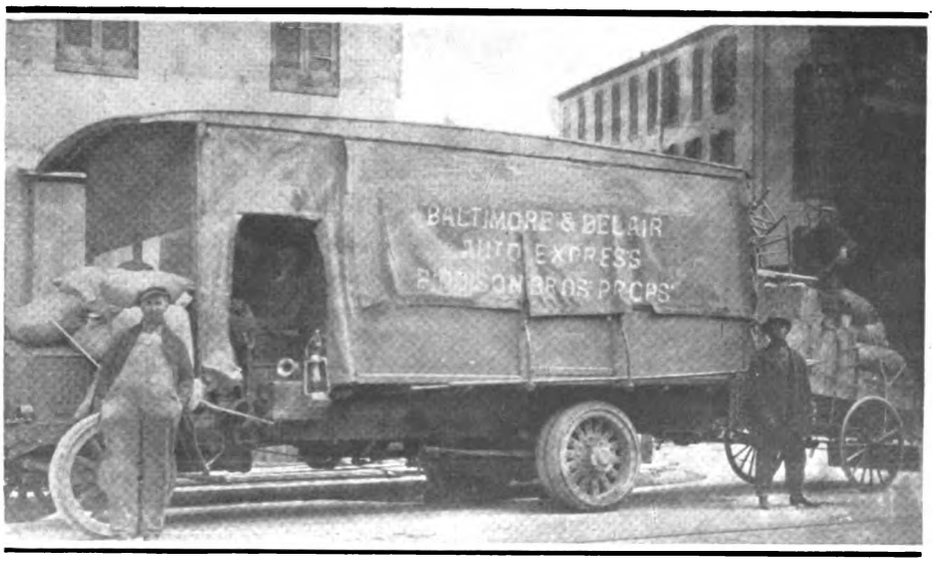
GENERAL freighting in competition with two of the strongest railroads in the east has been successfully conducted for 3 years by a Baltimore operator of motor trucks. The work consists of transportation of farm and dairy produce from farming communities in a radius of 30 miles to the market at Baltimore and return hauls of supplies and general freight from thence to the rural towns.

The Baltimore & Belair Auto Express is the largest of several similar concerns in Maryland and serves a section roughly sector-shaped, centering about Belair. It operates five trucks and trailers. It is subject to regulation by the Public Service Commission of the State of Maryland and in its regular express work and odd jobs of hauling and moving it has more work than it can do. G. E. Biddison is now the sole proprietor, the official board and the board of directors all in one, his brother, A. J. Biddison, who joined him in this venture, having retired some months ago to engage in other business. Mr. Biddison now has a capable manager in the person of George Schaefer.

Located in Market District

The home office and general freight depot of the Baltimore & Belair Auto Express is located at 613 Ensor street, Baltimore, where it not only has commodious quarters, as shown in the views, but ample room for the storage of freight. The office and depot, a two-story structure, is within a stone's throw of the famous old Belair Market where, from time immemorial, farmers from Harford county and a large section of Baltimore county have brought their farm produce and fresh milk for the city folk. Mr. Biddison could not have selected a more suitable location for a terminus, as results have proven. The Belair office and freight depot is located in Stone's Feed Store, Main street, in the very heart of the business section of that county seat town. Here, too, the trucks come in and go out heavily laden, as in Baltimore, while oftentimes the agent at that point is driven to his wit's end to handle the business.

This concern operates four trucks, with a fifth for emergencies—and emergencies arising every day. They are big fellows—two 3-tonners and three 4-tonners, all mounted on Packard chassis. As will be noted, they are loaded with bulky freight at side doors specially constructed for the purpose, and which are easily removed, while smaller packages are loaded in the forward compartments, also shown in the views. Note again that the trucks are supplied with trailers, which are pressed into service when freight along the several routes becomes congested. Not only is this of frequent occurrence, but Mr. Schaefer admits that it really has become a perplexing problem.



One of the 4-ton Packards with a trailer in tow

Trucks Always Busy

These trucks are making overtime and running any time in order to remove the freight along the routes served by them and to serve those who desire transportation for household goods and furniture, for Mr. Biddison not only conducts a general freight and express business, but general hauling as well. There is always somebody and something to be moved and Mr. Biddison seems to be the one to whom they look to do the work. He has moved families as far down the Eastern Shore of Maryland as Chestertown and Centreville, and as far west as Pittsburgh, Pa.

The trucks come in to Belair Market early in the morning freighted down with dairy products from the agricultural sections of Baltimore and Harford counties. These trucks, which are the first to arrive, are known as milk trucks. No sooner are they unloaded than they are loaded with a variety of freight consigned to country merchants throughout the counties and hurried away on the return trip. Nor is any time lost at the Churchville, Dublin, Jarretsville and Emerton ends of this system, or anywhere

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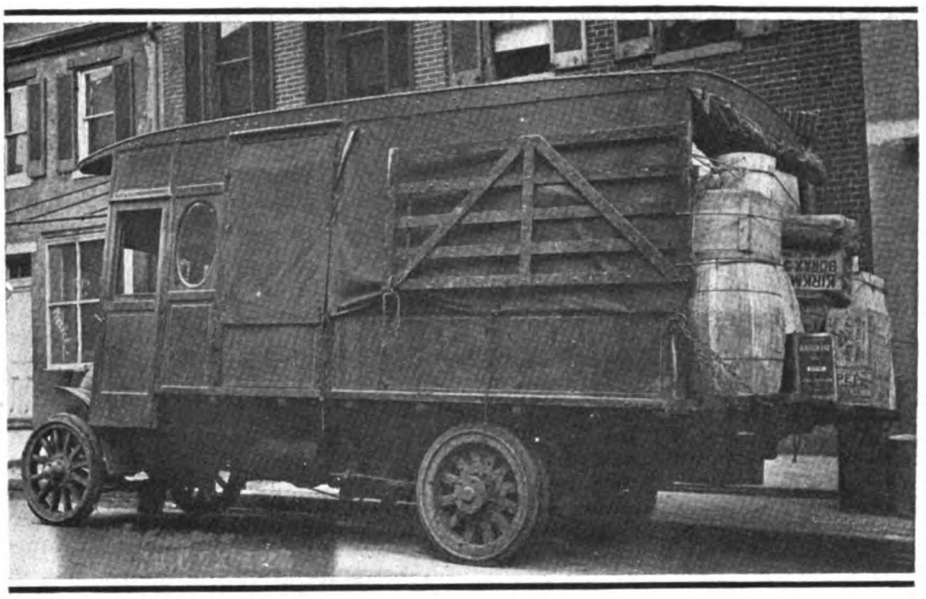
along the routes. Each truck is operated by two stalwart men who, with the facilities they have for loading and unloading, are not so hard pressed to make the time between terminal points.

Between Baltimore and Churchville, a distance of about 32 miles, the run is made in something less than 4 hours—an average of 8 miles per hour. About the same average is made on other routes. There are, of course, a number of towns served on these routes, all having freight to be forwarded or received, which requires some time. Not only are twice-a-day trips made where possible but, in railroad parlance, extras also are run in order to relieve freight congestion.

Keep Trucks Looking Neat

The trucks are kept looking neat and trim with frequent dressings of paint and their forward compartments, in which are stowed the express packages, and which also afford protection to the crew, are, in reality, far beyond the forward compartments thus far seen in any of the passenger buses in Maryland.

This concern is competing with two of the greatest railroad systems in the country—the Pennsylvania and the Baltimore & Ohio railroads, and successfully. In business less than 3 years, having run the first truck March 17, 1914, Mr. Biddison has steadily forged ahead, showing his aptitude for transportation work by giving the public what it wants and always value received, until now no railroad system, however great, can force him out of business save only by buying the business, and it is not in the market nor is it likely to be.



Truck loaded for return trip into the country

He understands the public and the public understands him. Between them there is a mutuality of interest which no railroad company can dissolve, try as it might, and so long as Mr. Biddison desires to conduct a freight transportation business, at the same time complying with all the requirements of the Public Service Commission, this mutuality of interest will remain unshaken, the people whom he serves are with him and cannot be coaxed or cajoled into withdrawing their support. These railroads are beginning to feel the force of Mr. Biddison's hold upon the people and his successful management of his big motor trucks, as is evidenced by the views shown in this article. They are a faithful portrayal of Mr. Biddison's everyday business.

The conditions upon which goods are received for shipment are as follows: The company undertakes to transport all shipments to the nearest point to destination reached by it only, and there transfer to its connections, which then become agents of the owners of the property. It is not liable for loss or damage caused by fire or water on trucks or in warehouses, or caused by breakage of glass or other fragile fabrics which are received at owner's risk nor for value beyond $50, unless so specified and insured, nor for loss or damage to goods not properly packed and secured for transportation, nor for damage caused by detention of trucks, nor for loss or damage that may occur on the lines of its connections, nor is it responsible for claims made 24 hours after shipment.

The company operates under a tariff rate commensurate with weight and distance but this rate is withheld. It was learned, however, from sources that may be termed semi-official, that the tariff on lighter packages, or express, as it is called, ranges all the way from 10 cents to 35 cents, dependent upon size and the destination, while the tariff on heavy freight, such as is consigned to country merchants by the big wholesale houses in the city, fertilizers, agricultural implements, etc., is somewhere around 10 cents to 30 cents per 100 pounds. This also depends upon the character of the shipment and its destination.



All kinds of freight is handled by the Belair Trucks

How Routes Are Served

As previously stated, the Baltimore & Belair Auto Express is serving four inter-county routes, all of which touch at Belair. The first is the Baltimore-Churchville route, a distance of about 32 miles. Thirteen towns are served along this route. Leaving Baltimore, near Belair Market, the towns run as follows:

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Gardenville, Raspeburg, Belmar, Overlea, Fullerton, Perryhall, on the Baltimore & Ohio Railroad; Kingsville, Fallston, on the Pennsylvania Railroad; Joppa, on the Baltimore & Ohio Railroad, and Belair—the distance from Baltimore to Belair being 23 miles—thence from Belair to Fountain Green, Fulford, on the Baltimore & Ohio Railroad, and Churchville, a distance of nearly 10 miles from Belair. It will be seen that not all of these towns are on railroads.

Routes Out of Belair

The second and third routes, with Baltimore as the dispatching point, serve the same towns from Baltimore to Belair as Route No. 1, thence from Belair Route No. 2 switches off in a northeasterly direction to Blaine, Hickory, Kalmia, Darlington and Dublin, the latter within a short distance of the Susquehanna river. This route is a trifle over 30 miles. The third route makes two towns in a northwesterly course from Belair—Forest Hill, on the Pennsylvania Railroad, and Jarrettsville. This route is 29 miles.

Another Route from Baltimore

The fourth and last route, starting from Belair Market, Baltimore, is 27 miles in length. The towns served are Lauraville, Hamilton, Parkville, Carney, Cub Hill, Fork, Record, Fallston, on the Pennsylvania Railroad; Scarff, Watervale, Belair and Emerton. Belair is on the Pennsylvania Railroad.

Excellent Road Conditions

No finer section of the country is to be found anywhere in the United States than that traversed by the Baltimore and Belair Auto Express. The counties of Baltimore and Harford have always been noted for their good roads. Long before the now famous state roads were dreamed of residents of these counties had given but little attention to road-building because of the fact that Nature had provided them in the very beginning. Hills there are a-plenty, and not a few of them steep, yet so solid and compact is the road surface that motor vehicles of all description, whether light or laden with freight or passengers, experience but little difficulty in ascending them. The big trucks of the Baltimore & Belair Auto Express have never yet failed in reaching the top of any of them, and their routes do not follow the state roads, in their entirety, as is the case in many other counties of Maryland. Richness in agricultural and other products, and the presence of mammoth industrial plants here and there, is sufficient guaranty of the success of such an enterprise.

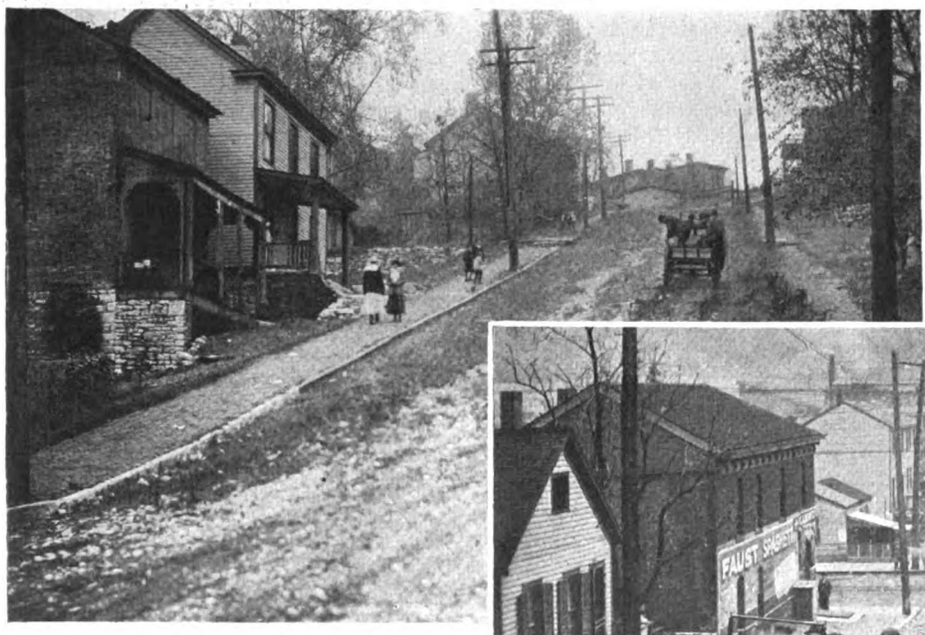
Big Populace Served

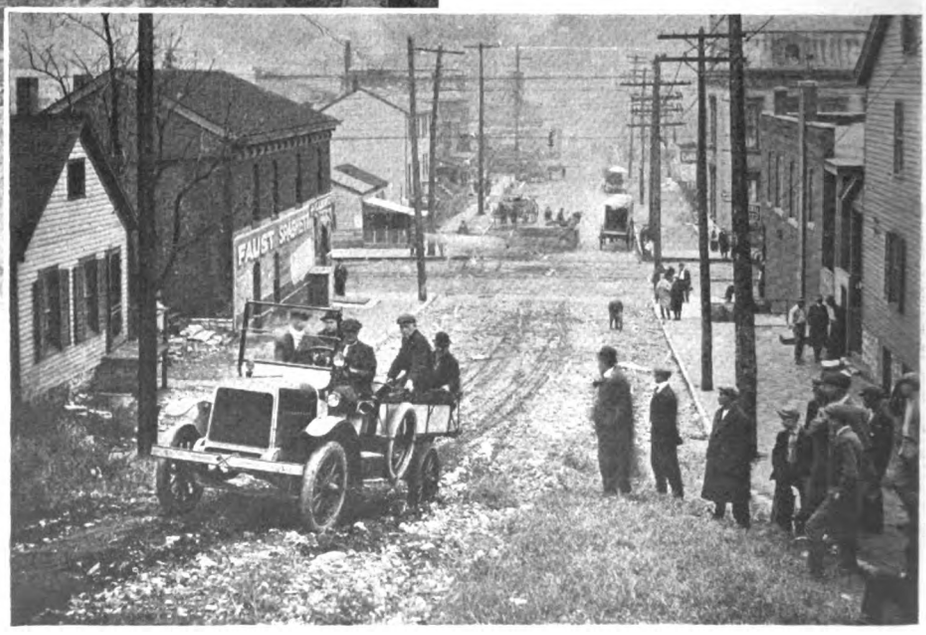
It would be hard to determine with any degree of accuracy just how many people are served on the four routes of this concern. Ten thousand or more live on and near these routes—a conservative estimate, to say the least. Of course, it is the aim of Mr. Biddison to serve them all whenever they may need such service as he has to offer, and it also may safely be said that few are the days when at least two-thirds of the approximate number living on the routes are not in some manner — though remotely, perhaps—served by his trucks. The Baltimore & Belair trucks are making money for their owner and it is this great aggregation, and not the elect alone, who are responsible for Mr. Biddison's remarkable achievements and successes in the great field of freight transportation.

Railroads Cannot Compete

At the very outset Mr. Biddison found himself in competition with two powerful railroad systems, yet notwithstanding this the business has steadily increased from day to day.







Just to prove that the Denmo truck is a good hill-climber, Charles R. Porter, St. Louis distributor for the Deneen Motor Truck Co., Cleveland, O., drove a 1½-ton chassis with a 600-pound body and eight passengers up a hill with a 45 per cent grade. This hill was at Alton, Ill., at the end of Seventh street. It is said that this hill has proved the Waterloo of many other trucks in previous attempts at scaling it

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Tractive Resistance on Various Pavement Types

Road and Laboratory Tests Conducted by Massachusetts Institute of Technology

EFFECTS of different pavement surfaces on the power consumption of motor trucks are more marked than is apparent on the surface. Tests of a very thorough nature, conducted by the Massachusetts Institute of Technology last summer and just made public, showed that on a badly-worn macadam street three times as much power was consumed under similar conditions as on a smooth asphalt pavement.

The tests were conducted by A. E. Kennelly and O. R. Schurig of the research division, electrical engineering department of the institute, and are fully reported in Research Bulletin No. 10, dated June, 1916. The vehicle used was a ½-ton G. V. electric truck of the type used by Lord & Taylor for parcel delivery work.

These tests comprised laboratory tests of the efficiency of the vehicle itself and road tests to determine the tractive, impact and air resistances in operation. The tests are described in the report as follows:

How Tests Were Made

"Laboratory Tests—In order to determine the truck-mechanism overall efficiency, from storage battery terminals to tire treads, the car was taken into the Lowell laboratory, the rear wheels raised from the ground, and belted each to a load generator. The motor was then operated through the controller, at a number of speeds and outputs. . . .

"The speed of the rear wheels, in these laboratory tests, was measured by means of a magneto belted to one of the wheel brake drums. It was also checked by means of a magneto coupled to one of the load generators."

Other smaller devices took account of the difference in speed between the two wheels, due to the differential, losses in the driving belts, friction losses in the front wheels and the efficiency of the electrical units in the truck.

"In order to investigate the effects of road surface quality on tractive resistance," the report states, "stretches of nearly level typical urban roads were selected. . . . Runs were made with the truck over each selected stretch of road, at nearly constant speed by controller, and successively in both directions for each controller point, thus covering the range of speeds afforded by the controller. The effect of load in the vehicle, upon tractive resistance, was also tried in a few cases.

"Previous to the first test of the day the storage battery was fully charged. The crew consisted on one driver and two observers. The driver confined his attention to steering the car, while running at constant controller position. If the driver had to change the controller position, or apply the brakes during the run, the run was repeated.

"The first observer was stationed on the front seat, beside the driver, and noted the stop-watch times of start and finish, as well as the readings of the speedometers during the run.

"The second observer was stationed in the body of the truck, and continuously took readings of voltage and current at battery terminals by calibrated measuring instruments; these instruments being supported on cushions to minimize their vibration.

"The start and finish for each stretch of road were marked off by chalk or other clearly-visible lines drawn across the roadway. The car was always set in motion at a suitable distance behind the starting line so as to reach approximately steady speed when this line was crossed. A stop watch was started by the first observer at this moment. It was stopped by the same observer at the moment when the front wheels of the car crossed the finish line. The reading of the stop watch was thus the time of the run.

"The length of the run between start and finish lines was determined by means of a tape line. The runs varied in length from 400 ft. to 2600 ft.

"Wherever the grades of the test stretches were not obtained from the city maps, they were measured directly on special days by the car observers with surveyor's level and rod in the regular way.

"For each controller speed the car was run three times in each direction over the test section in immediate succession. By this method of running in alternate directions over the same section, the effect of wind on car resistance was approximately eliminated on the assumption that if the wind was blowing it was uniform in velocity and tended to exert a uniform pressure on the car, whether the latter was running with it or against it. No heavy windstorms occurred during the period selected for the tests. The arithmetical mean of the road resistances as measured at nearly constant speeds in opposite directions was assumed to eliminate the effect of wind velocity.

"A further correction, namely, that due to the change of kinetic energy imparted to the vehicle between start and finish, became necessary because the speed was not constant during the run; that is, a slight retardation of acceleration took place over the test stretch in spite of the fact that the controller was not changed, that roads of uniform grades were selected and also that the truck was started as far in advance of the mark as was practicable. The energy imparted to a truck which is accelerating, includes not only that necessary to overcome its internal and external resistances, but also that definite amount of energy which is required to produce the acceleration. . . . This energy is subtracted from the total energy imparted to the truck."

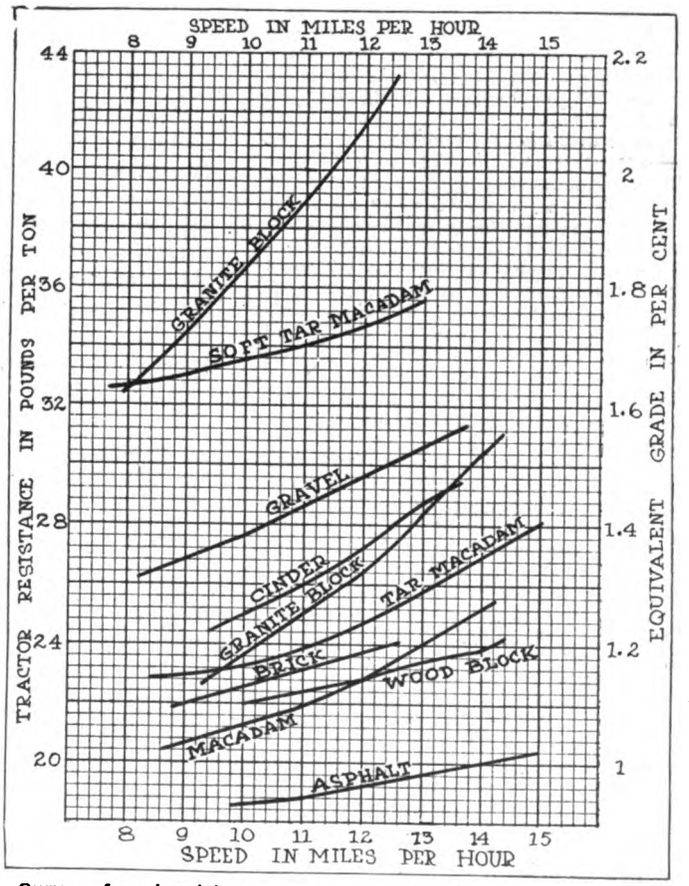
Conclusions Reached

The results of the tests brought out the following conclusions:

"There are three principal elements which determine the tractive-resistance-speed curve for unit weight of a given vehicle within the range of conditions covered by this test:

"1—A constant resistance, the magnitude of which depends upon the lack of resilience of the road surface and the tire material, that is on the energy losses due to displacement of tire material and road surface material. This constant element would be encountered upon a smooth, level road of the particular type of road in the absence of impact, air and wind resistances.

"2—An increasing resistance with increasing speed, due to impact losses which results from lack of smoothness of road surface; losses of this nature are



Curves of road resistances as determined by Massachusetts Institute's experiments. Horizontal spaces represent speed; the scale to the left, road resistance in pounds; to the right, equivalent grade in per cent. By equivalent grade is meant the hill which a truck could climb under ideal conditions with the same power required to move forward on a horizontal plane over the surface represented. The curves each represent a separate type of pavement

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SUMMARY OF TRACTIVE RESISTANCES OF DIFFERENT URBAN ROADS AT DIFFERENT SPEEDS

All tractive resistances are expressed in equivalent per cent grade

Road		Equivalent Per Cent Grade		Per Cent Increase in Tractive Resistance from 10 to 12.4 Miles per Hour	Comparative Tractive Resistance Factors Referred to Asphalt Roads	
Type	Condition	At 10 Miles per Hour	At 12.4 Miles per Hour		At 10 Miles per Hour	At 12.4 Miles per Hour
Asphalt	Good	0.93	0.97	4	1.0	1.0
Asphalt	Poor	1.03	1.16	11	1.11	1.20
Wood block	Good	1.10	1.15	5	1.18	1.18
Brick block	Good	1.12	1.21	8	1.20	1.25
Brick block	Slightly worn	1.14	1.27	11	1.23	1.31
Granite block	Good	1.83	2.16	18	1.97	2.23
Granite block, with cement joints	Good	1.16	1.37	18	1.25	1.41
Macadam, water bonded	Dry and hard	1.06	1.17	10	1.14	1.20
Macadam, water bonded	Fair, heavily oiled	1.63	1.76	8	1.75	1.82
Macadam, water bonded	Poor, damp, some holes	1.65	1.89	15	1.78	1.95
Tar macadam	Good	1.17	1.27	9	1.26	1.31
Tar macadam	Very soft	1.67	1.76	5	1.80	1.81
Tar macadam	Many holes, extremely poor, soft	2.38	2.75	16	2.55	2.85
Cinder	Fair, hard	1.25	1.39	11	1.35	1.43
Gravel	Fair, dusty	1.37	1.50	9	1.47	1.55

usually known to vary approximately as the second power of velocity of impact; and,

"3—An increasing resistance with increased speed, due to air pressure against the front of the vehicle, which resistance is known to depend, roughly, on the second power of the speed.

"The constant resistances may be briefly called the displacement resistance, the *impact resistance*, and the *air resistance*. The *displacement resistance* is low for hard pavements and high for soft pavements, of low resilience. The impact resistance is very marked in granite-block roads. The air resistance at any definite velocity is the same for all curves, because the air-resisting parts of the truck were left unchanged throughout the tests.

"The displacement resistance of a road manifestly varies, not only with the type and surface quality of the road, but also with the type, dimensions and quality of the tires on the wheels of the vehicle. In the tests here reported the same tires were used throughout and they remained in substantially the same condition.

"The impact resistance of a road manifestly depends not only on the type and surface quality of the road and the size of its irregularities, but also on the type, dimensions and quality of the tires, the weight of the truck and the quality of its springs.

"The air resistance per unit weight of truck manifestly depends upon the weight, dimensions, and shape of the vehicle as well as on the speed of the vehicle relatively to the surrounding air.

"The wind resistance per unit weight of truck manifestly depends upon the weight, dimensions and shape of the vehicle as well as on the direction and velocity of the wind and the velocity of the vehicle. It is assumed that at low wind and vehicle speeds, like those here considered, only that component of the wind which is in the direction of the vehicle's path needs to be taken into account and that the mean of the wind resistances in opposite directions along the road is zero."

Data resulting from these tests, based on the performance of this truck on urban roads near or in Boston, with solid tires at from 8 to 15½ miles per hour, follow:

Overall efficiency of truck from battery terminals to rear wheel treads, maximum, ...78 per cent

Mechanical efficiency of transmission from motor to rear-wheel treads .. 90 per cent

At 12.4 miles per hour, air resistance equaled the equivalent of a grade of 0.11 per cent

Increasing gross vehicle weight 12 per cent had no effect on smooth roads, but increased tractive resistance on rough roads.

A layer of dust on a fair macadam road, ⅜-in. thick, increased equivalent grade .....0.15 per cent

Freshly-tarred, tar-macadam road had an increased tractive resistance equal to an equivalent grade of.....0.50 per cent

On such fresh tar, the truck weighing 4710 lb., sank 8/10 in.

NEW BOOKS

"Automobile Welding With the Oxy-acetylene Flame," by M. Keith Dunham, is a new publication of the hand-book type recently issued by the Norman W. Henley Publishing Co., 132 Nassau Street, New York City. For the maintainer of one or a fleet of motor trucks, for the repairshop man or for the service station, it would probably be hard to find a more practical or useful work.

Oxygen-acetylene welding is by no means a new thing, nor is it confined to motor vehicle work. It is a subject with which far too few repairmen are familiar, however, and a method of making permanent repairs which is too little appreciated. There are a host of repairs commonly made in other ways which, by oxy-acetylene welding, could be made more quickly, cheaply, permanently and neatly.

Acetylene welding is not dangerous or difficult when it is properly understood and carefully done, but there are many things about it that need to be thoroughly understood before attempting to undertake it. Mr. Dunham's book supplies a means of learning these things, in a straightforward, practical manner, the main features of the apparatus, its care, safety precautions, and the individual differences in the method of handling different classes of welds being simply told in brief but lucid terms, the subject matter being divided along logical lines and thoroughly indexed.

The book is 4 inches wide by 6¼ inches long, bound in flexible maroon imitation leather. There are 167 pages, eight chapters and sixty-six elementary line illustrations. It sells for $1.00.

"Automobile Driving and Repairs" is the title of a new 310-page book designed for the motor vehicle owner or driver who wishes to properly take care of his car, and for the repairman who is anxious to broaden his own experience. It is written by Morris A. Hall, formerly editor of THE COMMERCIAL VEHICLE, and George W. Cravens, and is published by the American Technical Society, Chicago. The book is divided into four chapters, each of which is profusely illustrated with half-tone and line cut illustrations. The first chapter is devoted to explaining the proper method of driving a passenger car or motor truck. It is pointed out that while the simple driving operation is one of the easiest things to acquire, there is an astonishing number of things which an inexperienced driver will do and continue doing to the detriment of the vehicle and its efficiency. To help the novice driver the authors point out how to start and stop the vehicle properly; how to change speed in the correct manner; how to take care of the electrical system of the vehicle and how to drive in traffic or on country roads and what road regulations must be obeyed and what precautions taken. Chapter II is devoted to troubles which affect the motor and its auxiliaries; the driving mechanism; axles; brakes; frames; tires; cooling system, and in fact every part of the vehicle. Actual troubles which have beset drivers are quoted and how to repair them given immendately below, in some instances with large illustrations. Chapter III is devoted to the application of welding in the passenger car and motor truck repairshop. The two mechanical types of electric and gas welding equipment and the methods of operation are described in full and well illustrated with views showing work in the course of completion. Chapter IV is devoted to various types of private garages and the tools and equipment which they should contain. This chapter is well illustrated with garage plans and exterior views and should prove of much value to the small truck user who wishes to garage his vehicles near his home or place of business, where he may keep in close touch with the work done on them. The book is printed on 5½ by 8¼ paper and is bound in leather.

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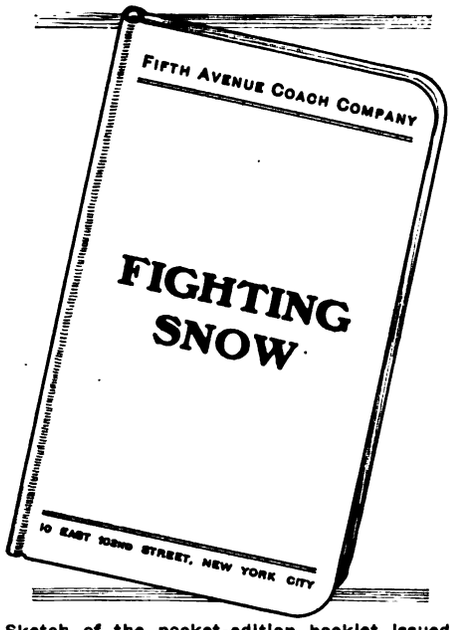
Type of snow plow used by the Fifth Avenue Coach Co., New York City, which operates 132 motor buses over 18.92 miles of city streets. Twenty-two such plow units, each manned by a crew of three men, including the bus driver, the bus conductor and the plow operator, are organized into twelve sections. Each section has a pre-determined length of street to keep clean. This information, together with the names of the men selected to be responsible for the work, how they can be reached at night and how the plows are to be operated, is all contained in a booklet published by the Fifth Avenue company and issued to all of its employes in advance of the snow season for their study

Mobilization of Private Vehicles May Solve City Snow-removal Problem

Practicability of Plan Proven by Efficient Organization of Snow-fighting System of the Fifth Avenue Coach Co., in New York City

THE time is near in twenty-five of our largest cities when it may become necessary to mobilize privately-owned motor trucks and horse wagons to remove snow from the city streets. Heretofore a snow storm of more than a day's duration has practically paralyzed the vehicular transportation in such centers. This has caused millions of dollars loss daily. It has been due to the lack of an efficient, planned-in-advance organization to remove the snow rapidly.

The great increase of motor vehicles of all kinds has increased the seriousness of the problem because of the loss due to delays to the newer and quicker method of motor delivery. The motor truck increase, however, offers a very tangible means of relief, provided the greater ground-covering ability of the motor truck as compared with the horse is made use of. In the past, most of the large cities have made use of this ability of the motor truck in but a limited degree. As a result it has been a common sight to see vehicles becoming stalled in deep snow on many streets several days after a storm, due to a lack of vehicles and men to quickly remove the snow.



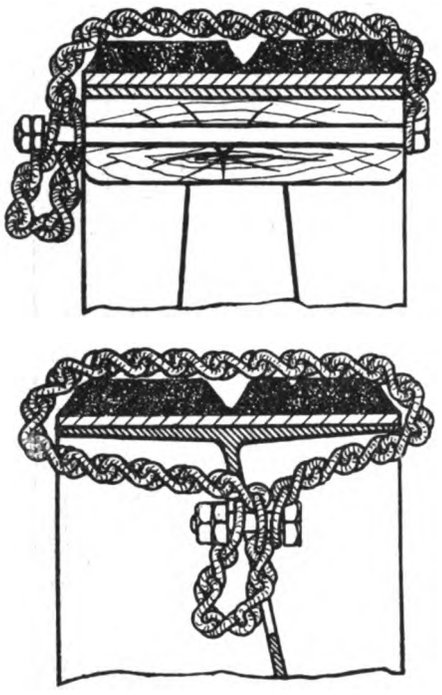
Sketch of the pocket-edition booklet issued by the Fifth Avenue Coach Co. to its employes and containing all the information necessary to their efficient operation of the concern's snow-fighting equipment

The difficulty in removing snow is increasing under the present plans of hiring available vehicles, as these are insufficient in number to avoid the delays and traffic tie-ups so costly.

Truck Mobilization Feasible

Many of those officials who are intrusted with the work of snow removal are of the opinion that one method of solution is in the forced mobilization of privately-owned vehicles. This would not be an impossible task, but one which would require considerable organization and perhaps statutory control so that the work would fall proportionately on all concerns operating vehicles suitable for any particular class of the work. Such a snow-removal mobilization of a percentage of the vehicles of all concerns would be an investment for the companies instead of an expense, provided all concerns shared equally in the work

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Partial cross-sectional views of the wood and steel wheels used on the Fifth Avenue buses and showing how non-skid chains are to be applied. In each case note how the loose end of the chain is secured to the wheel by slipping it over the end of the hold-on bolt and kept in place by means of lock nuts

in proportion to the number of vehicles used.

For example, John Jones would probably find it cost him less if he put three of his twelve trucks in the snow removal work for a certain number of hours, than it would if all twelve were stalled on and off for several days after the storm. The money which he would lose due to the tie-ups of his goods in transit in the latter case would be far greater than the cost of one-fourth of his vehicles for a short period directly after the storm before the snow had gotten a big headstart.

The vehicles engaged in snow removal should be paid a proper compensation for the reason that light delivery vehicles such as 1,000-pounders probably would not be suitable for either plowing or hauling the snow. Concerns owning such vehicles would have an unfair advantage over those whose trucks were engaged in the work if the latter were not paid a proper compensation.

Unfolding the plan further it would be entirely feasible to register the number of trucks suitable for the work that are garaged or maintained in any one of a number of sections into which a city might be divided. Furthermore, it might be determined in advance precisely what trucks are best suited for snow plowing and those for carting, the latter perhaps having large box bodies with dumping mechanism.

Advancing a step further it would be feasible to list all such trucks and their fitness for certain classes of the work and the names and addresses of the drivers on index cards to be kept at the precinct police station in each of the districts. Then, when the snow had reached a depth of 1 inch, the police force could co-operate in the work by notifying the drivers by telephone or messenger that such and such trucks were required for such and such work in some predetermined area. The number of trucks required for any area; the streets to be cleaned in that area and the number of men required, could all be arranged in advance and this information published in a book distributed to those who would have to do the work. Similarly the extra men for loading the snow could be obtained from the street cleaning force, since the latter cannot sweep the streets during storms. Extra men could be employed or others transferred from other city departments in cases of emergency.

The control of such an organization should be centralized in one man and his staff, perhaps the street cleaning commissioner, who would delegate his authority to sub-lieutenants to carry on the work in all of the sections and report to a central bureau the progress of the work in each area.

Fifth Avenue Bus Organization

That such a plan is not only entirely feasible but practical is shown in a most convincing manner in the case of the Fifth Avenue Coach Co., which operates a fleet of 132 buses on New York City streets. That concern has issued a most comprehensive booklet on the subject of snow removal which municipal authorities could emulate with profit.

Starting out with the understanding that fighting snow is a man's job, this bus company has evolved a plan to keep its buses in operation over their scheduled routes and to reduce the wear and tear on the vehicles. This plan consists of the necessary equipment, the men to do the work and the method of doing it.

The 18.92 miles of city streets over which the buses operate are divided into twelve plow sections with a total number of twenty-two plow units, each consisting of a bus and a plow trailer manned by a crew of three men.

In addition, the company also maintains three 5-ton sand trucks, each manned by a crew of two men. The latter equipment is used to sand the streets covered when the surface has become slippery as when surfaced with a thin film of ice.

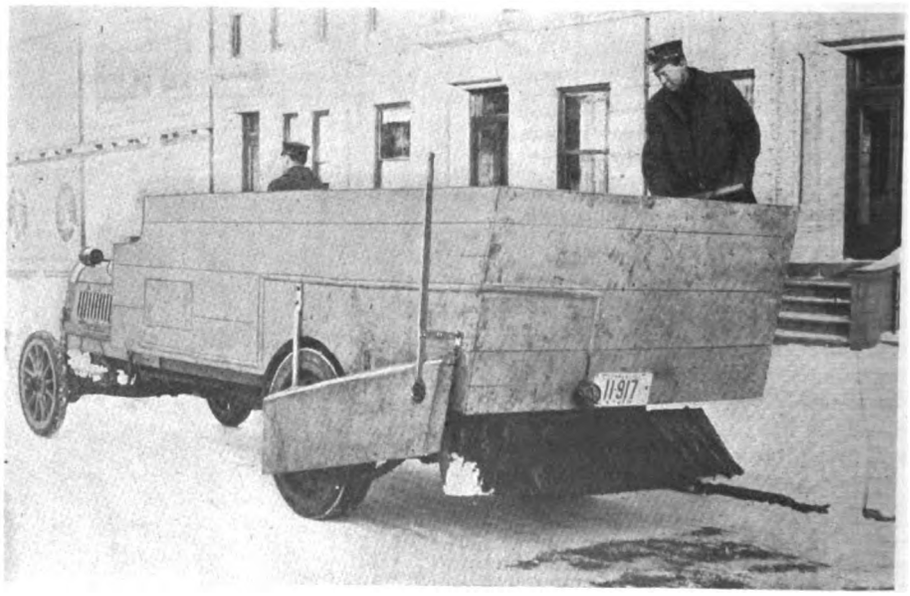
Each piece of snow-removal equipment is kept at a certain known point and certain known men are intrusted with the responsibility of seeing that each piece of apparatus is set to work in its own particular territory and does not move out of it unless specially ordered.

How the System Works

As soon as the snow has reached the depth of 1 inch, the snow-fighting force immediately starts work. It matters not if it is in the middle of the day or night, the machinery is at once set to work under the direct supervision of the chief engineer and superintendent of the bus company. He or his assistant is the central figure from which all strings radiate and the one by whom all orders are issued. This is centralized control and deputized operation.

The men to operate the equipment are selected in advance. If the call to put it into operation is received at night, these men are notified by telephone or messenger. They must report at specified points and remain on duty until relieved.

All of this information is contained in Part I of the booklet. A copy is given to each employe. He studies it to become acquainted with the particular part of the work which he is to do. He carries it with him. When the snow call comes, each man has but to refer to the book to learn his task. If at night, the persons to be notified and the easiest way of reaching them are found in the book. It also specifically states the equipment to be used on each of the



The type of the three 5-ton street sanders employed by the Fifth Avenue company to sand slippery street surfaces. Each has a large, low wooden box to carry the sand and a distributing device at the rear to spread it evenly over the road. The device consists of a pair of rollers, one of which has coarse gear teeth through which the sand is fed. The toothed roller is driven by chain and sprocket from the left rear wheel as shown. As the truck moves ahead, the sand is automatically fed down in an even blanket whose thickness remains constant regardless of the speed of the truck

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snow-fighting routes, of what it is to consist and where it is to begin work and where it is to stop. This is real preparedness.

The second part of the book deals with the manner of operation of the snow plows, the sanding equipment used when the streets are slippery and rules which the drivers must follow to secure the best results. This information is written in such a manner that the drivers of the buses and the snow plow and sanding operators will understand it. This is further aided by the use of illustrations showing the operators in the act of following out the printed instructions. Besides the actual operations of the machines, instructions are also given regarding how the plows shall be attached to the rear of the buses and exactly how the non-skid chains required on the rear wheels of the latter are to be applied for both steel and wood wheels.

Information telling where sand required can be obtained at all times of the day or night is also given with a map showing the snow plow and sand routes and a list of public telephones available all night from which the men in actual charge of the work may call up the superintendent's office and acquaint that official with the condition on each particular route.

Operating Rules Excellent

The rules contained in the book regarding the proper method of operation of buses on slippery or icy streets are perhaps the best that have been published in brief, concise form. They should be followed by all drivers of motor trucks. For example, when coming to a standstill, it is stated that the brakes should be released just before coming to a full stop, so that the vehicle will roll the last few inches. This will prevent the wheels from sliding and glazing the icy surface to a sufficient extent to cause them to spin when the vehicle is started.

Many drivers give their engines too much gasoline when starting, thereby causing the wheels to spin. By feeding very little gasoline while allowing the clutch to engage easily, the spinning of the wheels may be overcome and the vehicle started, after which it may be accelerated gradually. It is not necessary to accelerate the motor greatly when getting under way on greasy, wet or icy roads because they offer less resistance than dry surfaces.

The amount of power required to start or stop a vehicle depends on the resistance between the road surface and the driving wheels. It is obvious that if the road is slippery and the wheels spin and skid, the driving and breaking effort is decreased accordingly and it is therefore recommended that drivers do not drive down hill any faster than they can drive up it.

If one private company finds it worth while to issue such a book to its employes telling them how to operate their vehicles, how to plow the snow and how to sand the 18.92 miles of streets, how much more valuable would it be if such a course were followed by the municipal authorities?

Would not the operating instructions of such a book distributed generally by a municipality result in great economic good in that it would save many thousands of dollars by eliminating the delays of goods in transit, not to mention the reduced wear and tear on the vehicles?

Outdoor Motion Picture Photography Possible, Thanks to Truck

Powerful Gasoline-electric Generating Plant on 5-Ton Chassis Helps Film "Battle Cry of War"

"HOW far that little candle throws its beams!" marveled Portia, reflecting on the influence of "a good deed in a naughty world." Modern science, acting on Shakespeare's wise observation, has provided a candle whose beams are thrown so wide that millions are dazzled by them; in every quarter of the globe, and for years of time.

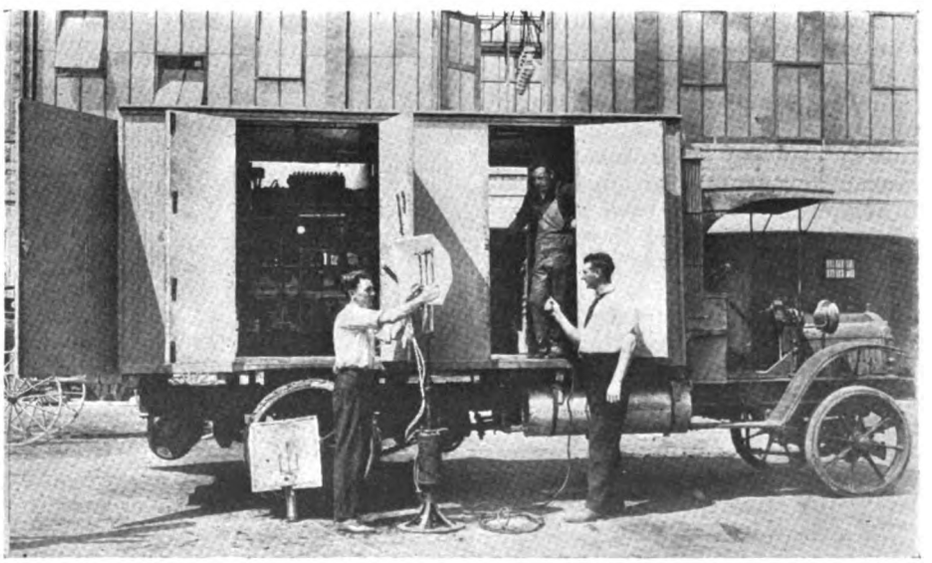
Whether the deed be good or evil, the motion picture portrays it faithfully and widely. Whether it is the good or the bad features which most interest "a naughty world," this world is so greedy for what the pictures tell that the film companies are kept working overtime and night and day supplying the endless variety of wonders, thrills and novelties that entice the festive jitney.

The Vitagraph company, accordingly, has been forced to provide a candle which not only can throw its beams far and wide, but can throw them on scenes remote from the studio. Outdoor motion-picture filming at night has heretofore been restricted to locations contiguous to electric lines that might be tapped for current to light the arcs. To furnish such current independently it has accordingly purchased a portable electric-lighting plant, mounted on a 3-ton White truck chassis.

Recently, in taking some night scenes in "The Battle Cry of War," a sequel to "The Battle Cry of Peace," the new equipment was given its first trial.

Current is generated by a five-cylinder marine gasoline engine carried in a compartment of the van body, to the rear. This is direct connected with a 120-volt generator of 218 amperes. The generator is housed in the forward compartment, which is entirely separate from the after one. The engine develops 50 hp. at 750 r.p.m. It is cooled by vertical tube radiators mounted on the front wall of the body on either side of the cab.

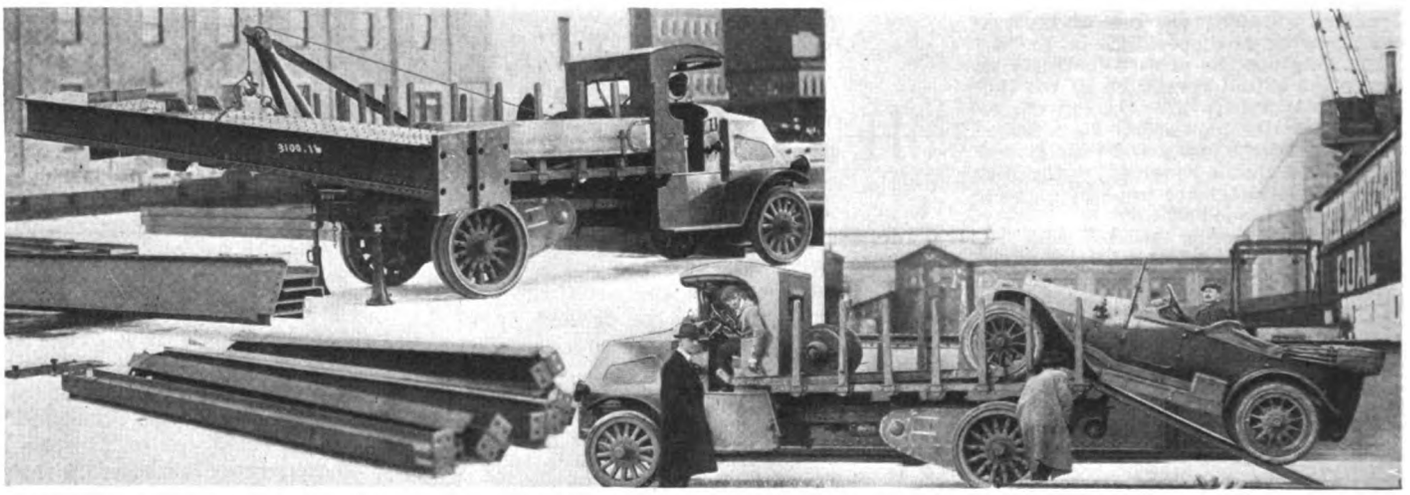
Asbestos fireproofing lines each compartment, and rubber mats insulate the machinery from the chassis. A shallow compartment at the rear serves to carry the arc lamps, which are of the regular studio type, and a sufficient number of wire leads are provided to keep as many of them burning as are necessary for the production. The power of this outfit, it is estimated, is sufficient to light three city blocks in the manner they would be lighted from regular city mains.



White electric generating outfit being made ready for a trip from the Vitagraph studio

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SPECIAL SERVICE



THE WINCH MAY BE USED FOR ALL SORTS OF PURPOSES, SUCH AS IN THE PULLING OVER OF DANGEROUS WALLS, WHERE IT SERVES TO PULL THE CABLE OF THE DERRICK. IT CAN TOW DISABLED VEHICLES, OR BY REMOVING THE DERRICK AND ATTACHING THE SKIDS IT MAY PULL SUCH A WRECK ONTO ITS OWN BODY

Wrecking Truck Diminishes Fire Dangers

WRECKING is one of the most important features of the work of a fire department, and in line with the rapid and almost universal motorization of fire-fighting equipment has come the motorization of the wrecking portion of Boston's fire department. For this purpose a 3½-ton AC model Mack chassis has been fitted with a special wrecking outfit which is interesting.

The work of this truck will be to aid in wrecking during a battle with the flames and for subsequent clearing of traffic and removal of dangerous ruins. For example, picture a warehouse burning in an inaccessible portion. This truck, through its special equipment, will be able to tear down whole walls, giving the firemen a chance to reach the base of the fire. If vehicles obstruct the way so that the fire engines and trucks cannot reach the scene, the wrecking truck will be called upon to move them to one side, regardless of how disabled they may be. Derailed street cars can be replaced on the rails; trucks and fire engines may be extricated from holes in the street caused by caving in. In a fire in a railroad yard this truck may move freight cars from the source of danger, or burning ones away from combustible surroundings.

The equipment of the vehicle comprises a removable derrick at the rear end, a platform body with stakes, two large skids, carried one on each side of the body, a power winch with 250 ft. of ⅝-in. cable, two powerful screw-jacks, and miscellaneous wrecking tools.

Equipment Has Many Uses

The winch may be used for all sorts of purposes, such as in the pulling over of dangerous walls, where it serves to pull the cable of the derrick. It can tow disabled vehicles, or by removing the derrick and attaching the skids, it may pull such a wreck onto its own body.

The jacks are placed under the rear end of the body when the derrick is used, so as to take the stress from the springs and axle.

Sprags are fitted to take the thrust when using the winch for pulling. The truck is painted a bright red and has electric starting and lighting, for a quick light-up and getaway in an emergency.

Such a vehicle has a field of usefulness not confined to fire department work, since it can also be used by construction companies, contractors, house-wrecking concerns, etc.

Luxuries in the Wilderness

ONE thousand miles from a lemon! That is the familiar saying which best describes the situation of the hotels and eating houses throughout the Yellowstone National Park, Wyoming. Yet despite this remoteness from markets of any size, tourists through this wonderland are fed on the same staples and luxuries to which they are accustomed in their own homes. Since this fare includes much highly-perishable produce, and in view of the fact that all railroads are remote from the park, it at once becomes apparent that some rapid means of transportation must be provided.

Of course, it is the motor truck which is used. The nearest railroad station is 75 miles away over the sharp ridges of the Rockies and a fleet of three Whites is the connecting link.

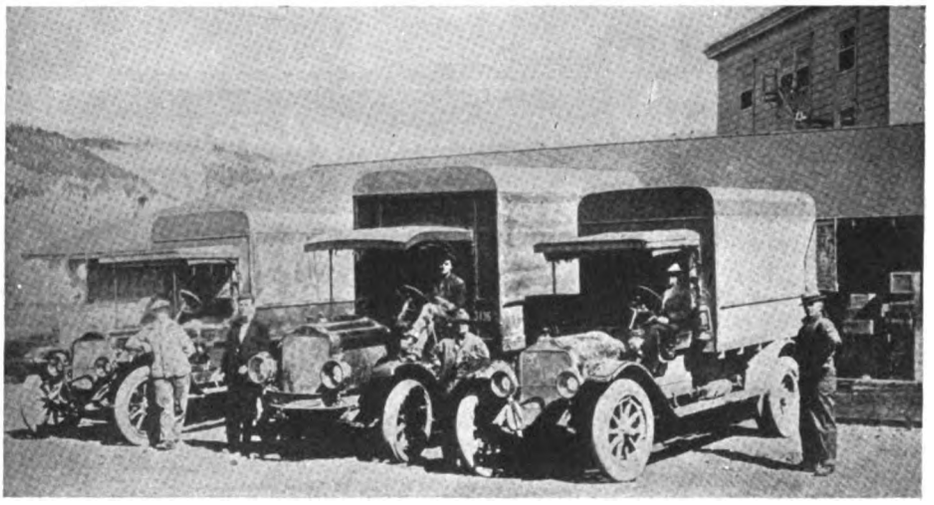
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Every pound of foodstuff and supplies necessary to the operation of the several hostelries in the park are hauled from the railroad and distributed by these trucks. Ranges with an elevation 8,000 feet above sea-level have to be crossed, the trucks operating day and night, covering about 125 miles a day of 24 hours during the season.

Two of the trucks are 2-tonners and one a 5-tonner. The big one makes the run from Gardiner, Mont., on the railroad to the Mammoth Hot Springs Hotel. From here the goods is distributed by the smaller ones to the Norris, Fountain, Old Faithful Inn, Thumb, Lake and Grand Canyon Hotels.

Formerly ninety horses and a large number of wagons were needed for this work, being owned by the Yellowstone Park Hotel Co., the park concessionaire. The steep grades and great distances made it necessary that the horses travel very slowly and in relays so that it was very difficult to get perishable food to the hotels.

Needless to say, the trucks are on through routes and are run on fixed schedules. Although even a slight mishap would seriously disrupt the smooth running of the business, up to the time of closing the park, September 15, none of the trucks had missed a trip.



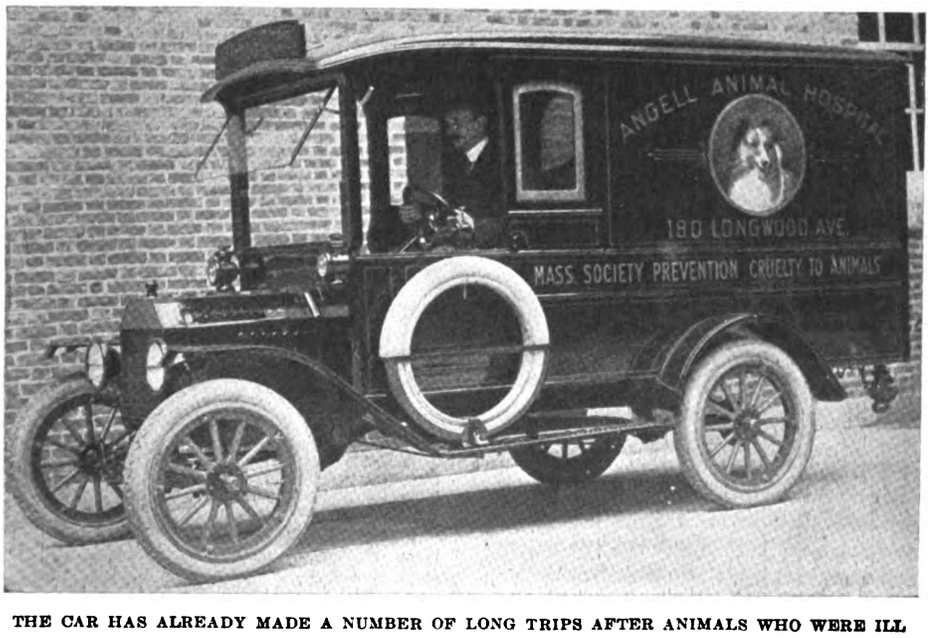
THE NEAREST RAILROAD STATION IS 75 MILES AWAY OVER THE SHARP RIDGES OF THE ROCKIES AND A FLEET OF THREE WHITES IS THE CONNECTING LINK

When Rover Is Sick

MOTOR vehicles are aiding in humane work in more ways than merely replacing horses as means of locomotion. Household pets, both canine and feline, are being cared for more humanely when sick than formerly in several of our cities due to the installation of motor ambulances.

Boston now boasts an ambulance designed especially for dogs and cats. It went into commission last week when Mr. and Mrs. Edmund T. Pratt, of Middleboro, Mass., presented it to the Angell Memorial Hospital for Animals, an institution started in memory of the late George T. Angell, founder of the famous Society for the Prevention of Cruelty to Animals. The body of the machine, mounted on a Ford chassis, was made to order. It is 7 feet long, 5 feet wide and 5 feet high and has a thick rubber mat that may be removed for cleaning. Ordinarily there is an attendant in the rear of the machine in addition to the driver. Where the driver alone goes for an animal a wire cage for a dog or a basket for a cat can be put in. For the sick animal there is a pillow to lie on. On either side of the car is an oil painting of a dog, Nemo, who was once an inmate of the hospital, and who is owned by Mr. Pratt. The car has already made a number of long trips after animals who were ill.

Its ability to cover ground rapidly may mean the difference between a dead and live pet; of much suffering or a quick and humane death.



THE CAR HAS ALREADY MADE A NUMBER OF LONG TRIPS AFTER ANIMALS WHO WERE ILL

ROAD ENGINEERING CONFERENCE

NEW YORK CITY, Dec. 11—Plans have been perfected for a national conference to discuss the subject of highway engineering instruction in the civil engineering curricula of universities and colleges. The meeting is to be held Dec. 29, at 8.30 p. m., in the assembly hall of the Automobile Club of America in New York.

It is under the joint auspices of the Society for the Promotion of Engineering Education, the American Assn. for the Advancement of Science, the National Automobile Chamber of Commerce, the Automobile Club of America and the National Highways Assn.

Preparation of the program is actively under way, and the papers presented and the discussions upon them will be published in the Proceedings of the Society for the Promotion of Engineering Education.

Organization of the meeting is due to the ideas and efforts of Arthur H. Blanchard, C. E., professor of highway engineering at Columbia University and secretary of Section D, Engineering, of the American Assn. for the Advancement of Science. It is a public recognition of the growing need of more technically-trained men in road construction, to which the attention of highway commissioners and of educational institutions throughout the country has been called by the National Automobile Chamber of Commerce.

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The Readers' Forum

Devoted to topics pertinent to commercial vehicle operation design and maintenance. Open to the use of all readers. Communications must be accompanied by the sender's name and address, confidential if preferred. No charge is ever made for this service.

GASOLINE TRUCKS ON PIERS

Transatlantic Lines Prohibit Them, but Coastwise Lines Do Not

To the Editor, COMMERCIAL VEHICLE:

I am writing to ask if you can give me any information regarding the use of gasoline trucks in seaport towns where they would have to do hauling to and from the docks.

The case in hand is this: We have a salesman who is in competition with electric trucks at a point where there is prejudice against gasoline trucks being used around the wharves. I know that gasoline trucks are used extensively at certain seaport towns, and at wharves where boats are unloaded, but have not any concrete information in hand.—HENRY T., Detroit.

As a general rule, the ban on the operation of gasoline motor trucks on the piers at seaports is being lifted. It exists because the insurance companies demand a higher premium where they are used. The extra charge made, however, is less than formerly, and some of the steamship companies which have rules in force barring gasoline trucks from their piers frankly admit that were they permitted to enter the pier, more of them would be used and congestion and disorder greatly reduced. One shore captain for an important transatlantic line made the assertion recently that gasoline trucks not only consumed less dock space, but that they moved in and out more quickly, that their drivers were faster loaders and unloaders, seeming to realize the value of time and that truck drivers were as a rule not as tough characters as horse drivers.

In New York City most of the transatlantic lines still prohibit the operation of trucks on their piers, although some permit them to run onto the bulkheads, some of these making a special effort to load and unload these quickly. Hardly any of the railroad or coastwise lines prohibit them, however. The sentiment in marine circles is strongly in favor of allowing them to be used, but the eventual removal of the restrictions is delayed by the fact that the steamship companies are waiting for the proportion of gasoline trucks to horse vehicles to become more preponderant before taking any steps; while the truck users are waiting for present regulations discriminating against gasoline trucks to be rescinded before installing these vehicles in their freight terminal service.

BRITISHER WANTS SWEEPERS

Motor Street Cleaning Machines Made by United States Manufacturers

To the Editor, COMMERCIAL VEHICLE:

I am anxious to get in touch with the makers of road sweeping machines, more especially, if possible, the concern which makes them under license of Laffly's patents or on Laffly's system.—C. R. GERRARD, M.I.A.E., London, Eng.

Laffly's system, as far as is known, is not used by any of the American manufacturers of motor street sweepers. Following is a list of these manufacturers:

W. E. Baxter, Los Angeles, Cal.

Elgin Street Sweeper Co., Elgin, Ill.

Kindling Machinery Co., Milwaukee, Wis.

Sanitary Street Sweeper Co., Oakland, Cal.

Clarence L. Smith Co., New York City.

Vacuum Street Cleaner Co., Minneapolis, Minn.

Way-Cleanse Co., Sandusky, O.

OIL TANKS FOR MOTOR TRUCKS

Makers From Whom Containers Suitable for Chassis May Be Bought

To the Editor, COMMERCIAL VEHICLE:

Can you advise us the names of makers of oil tanks suitable for handling gasoline and coal oil on motor truck chassis?—H. W. ACASON, president, Acason Motor Truck Co., Detroit.

The following concerns produce tanks suitable for application to motor truck chassis for the carrying of oils:

J. G. Brill Co., Philadelphia, Pa.
Dover Boiler Works, 50 Church Street, New York City.
Estey Bros. Co., 270 Union Street, Brooklyn, N. Y.
Charles Hvass & Co., 511 East Eighteenth Street, New York City.
George B. Marx, 200 Newell Street, Brooklyn, N. Y.
Fred Roeder Mfg. Co., 846 Grand Avenue, Brooklyn, N. Y.
Theodore Smith & Sons Co., foot Essex Street, Jersey City, N. J.

The above manufacturers are those who are known to have built tanks for this purpose; but almost any boiler works can construct tanks suitable for this use on comparatively short notice.

DECRIES TRUCK SALES ABUSES

Gotham Salesman Analyzes Conditions to Determine the Causes

To the Editor, COMMERCIAL VEHICLE:

How to eradicate a phase in the marketing of assembled motor trucks which is against the best interests of the manufacturers and doubly so to the agent's sales force, is the problem which the writer—as a sufferer in the latter case—would like to see solved. Concluding that a ventilation in a business paper which would reach the guileless manufacturer as probably the best means of initiating at least more business-like methods of appointing agents than the apparently slip-shod way that has been in vogue since the industry began to the present, I take the liberty of bringing the matter to your notice in the hope that the idea may receive your valuable co-operation.

Why the innocent motor industry should early in its existence attract a crowd of unscrupulous opportunists whose only thought is what can be got out of it in a given time—is more than I can account for, but that such is the case is unfortunately most palpable to anyone who has had any connection in the business. The facility with which agencies are acquired is simply astonishing, in the face of questionable antecedents, and only goes to show how easily the average manufacturer can be exploited by the immense volume of sales previously made and what can be promised him.

It probably does not occur to him how profitable the sales proved, or why the average agency was measured more by months than by years. In fact, it is a matter of note, the number of new agencies announced on the eve of each new year which begin with strenuous selling and which gradually diminishes or succeeds according to the merits of the business principles adopted. Then in the hands of the opportunist agent one can easily imagine how the most ambitious salesman is eventually rewarded, no matter how successful he may be in making sales.

The suave promises of co-operation, commissions to be paid on delivery, etc., are usually treated as the historic "scraps of paper," and the result is that after identifying himself to the best of his ability with a make of truck he has helped to popularize, he suddenly finds himself at loggerheads with the management, and unless he lacks all business stamina, he severs an undesirable connection and appeals to his lawyer.

The writer has just had the experience just outlined, and is but one of a number with similar experiences.

How the keen heads of the manufacturing firm came to place their products in such hands, when but a little inquiry

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would have informed them as to the antecedents of the principal, is a mystery, and only goes to prove the apparent lack of foresight that made such an appointment possible.

It is therefore to the interest of manufacturers that they look well into the character of the would-be agents before taking the chance of being misrepresented and experiencing all the consequences that follow such a mis-step. By so doing a step will be taken to rid the truck business of a class who without—in most cases—benefiting themselves, do infinite harm to all concerned, the manufacturer, the salesman and the buying public.—SPERO, New York City.

A situation is revealed here which by no means applies to all assembled trucks, as one, in a hurried reading of the above, might be lead to suspect, and which, fortunately, is nowhere worse than in New York City.

There is nothing for Spero to be surprised at, however, for in any youthful industry abuses of this nature are bound to appear. The faster the growth of a business, furthermore, the more general and acute these difficulties become. The motor truck industry need not be ashamed that such things as above related exist, but should rather be proud that they do not exist generally, and that there are so many fine, progressive and high-minded men in the business as direct the affairs of most of the successful firms.

Nevertheless, there is much food for reflection in Spero's letter. It takes a long time for the application of the survival of the fittest law to eliminate these destructive factors from the industry, due, unquestionably, to the ease with which individuals who fatten—or try to —on such practices are able to establish new connections seemingly without end. Doubtless many manufacturers have not yet learned that the acts of their agents are, in the eyes of purchasers their own acts; that sales which do not result in the creation of goodwill seldom return a profit; that people who appreciate good machinery and good service are those who have paid for them, and that buyers will deal ethically if the manufacturer meets them half way, but can usually go him one better in sharp trades.

We must also remember that these makers and dealers so frowned upon by right-minded factors in the business are only doing what most of those in the trade did in those early days that we are all trying so hard, now, to forget.

TRACK-LAYING MOTOR TRACTORS

To the Editor, COMMERCIAL VEHICLE:

Will you please give us the names of tractor manufacturers of the caterpillar drive type? We want ones making light farms, also heavy.—W. A. BROWN CO., Lincoln, Me.

A list of creeper tractors was given in the December 1, 1916, issue of THE COMMERCIAL VEHICLE on page 31.

WAR TRUCK CARBURETER TESTS

Data on Claudel vs. Pierce-Arrow Tests Wanted by Westerner

To the Editor, COMMERCIAL VEHICLE:

In your issue of September 1, 1916, under the heading, French Carbureters for U. S. War Trucks, it states the French Army authorities decided to adopt a uniform type of French carbureter. It further states that the Pierce-Arrow engineers attempted to show by demonstrations that the carbureters supplied with the company's trucks were efficient.

1—What were the results of these demonstrations?

2—Were the Pierce-Arrow carbureters retained or were they replaced by those of the Claudel type?

3—Can the Claudel carbureter be obtained in the United States?

4—Is it the opinion of THE COMMERCIAL VEHICLE that a vaporizer can be used successfully on a Pierce-Arrow 5-ton truck used in the haulage of gravel?

5—I have driven a Riker gravel truck for some time and have noticed that at night it apparently has more power and runs quieter than it does in the daytime. I understand that this condition also applies to passenger cars, but think that it is more pronounced in a heavy truck than in a lighter vehicle. This is undoubtedly due to the night air and also to the dampness. Now if the truck operates in the above manner at night, would not a properly-constructed vaporizer give the same results in the daytime? Could you recommend an efficient vaporizer?

6—It seems to me that in order to get perfect carburetion the carbureter adjustment should be changed with every variation of the weather, especially where the cost of operation, as is the case with a commercial vehicle, should be kept as low as possible. Is it the opinion of THE COMMERCIAL VEHICLE that a vaporizer would increas the mileage per gallon of gasoline on such a truck as mentioned?—JOHN R. BAKER, Minneapolis, Minn.

Answering the queries in the order given, THE COMMERCIAL VEHICLE would advise as follows:

1—The results of the tests are not procurable.

2—The Pierce-Arrow carbureters were replaced by those of the Claudel type despite the proven efficacy of the former for the reason that the French Government insisted on the Claudel type because it is non-adjustable.

3—No concern is known which handles the Claudel carbureter in this country.

4—By the word vaporizer, it is presumed that one of the various devices now on the market for the purpose of injecting water vapor into the fuel mixture to humidify it is meant. THE COMMERCIAL VEHICLE regrets that it has no authoritative information as to the actual value of such devices, although in theory they have merit.

5—Many are deceived by the behavior of motor vehicles at night, being led to believe that they are operating more efficiently or more quietly by the effect of the darkness. Driving through the darkness always gives the sensation of much greater speed than the same rate of travel in the daytime. The stillness is liable to deceive one into believing that his vehicle is operating with more snap than in the daytime. As for quietness, this illusion is often produced by the fact that one will unwittingly drive at a slower pace after dark due to the increased sensation of speed already mentioned. Naturally at a slower speed, any vehicle will produce less noise. The higher barometric pressure of the air at night may conceivably have a considerable effect on the motor operation, as it will often be noticed on foggy days that the damp air actually causes the performance of the vehicle to be less satisfactory instead of improving its action.

The following concerns manufacture various types of devices for mixing vaporized water with the fuel as fed to the motor:

Auto Gas Saver Co., National Life Building, Chicago.
Axtell, F. C., Marsh-Strong Bldg., Los Angeles, Cal.
Balzer & Son, Andover, N. J.
Baum, C. R., 1311 Baltimore Avenue, Kansas City, Mo.
Casey Asco Mfg. Co., 1504 Grand Avenue, Kansas City, Mo.
Comfort Motor Machine Co., 715 Galapago Street, Denver, Col.
Deitz Carbureter Co., 416 West Fourth Avenue, Denver, Col.
Gemco Mfg. Co., 666 South Pierce Street, Milwaukee, Wis.
Grothe Electric Co., 822 Jefferson Street, Burlington, Iowa.
H^2O Mfg. Co., Cambridge, Mass.
Muir Co., R. L., Philadelphia, Pa.
Popp Mfg. Co., 343 Third Avenue, Milwaukee, Wis.
Shumaker Motor Car Co., 383 Canterbury Road, Rochester, N. Y.

6—You are undoubtedly correct in your opinion that each change in atmospheric conditions calls for a readjustment of the fuel mixture, but unfortunately no automatic means of a thoroughly practical nature have as yet been developed which will alter the carbureter adjustment in response to the difference in humidity, air pressure and temperature. However, there is a possibility that future developments will result in some form of device which will give at least barometric and thermostatic control of carbureter mixtures.

If the motor carburetion is unsatisfactory, it would be expedient that the adjustment be tested and that proper connections be made to supply warm air to the fixed air inlet and possibly to the auxiliary. If the inlet pipe is of excessive length due to the low position of the carbureter, better results might be obtained if the pipe were shortened. This might necessitate placing the carbureter relatively high on the motor, so that the passage between it and the cylinders is of short length and the use of a pressure or vacuum feed system to take care of the higher level of the carbureter.

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Accessories for the Truck

Acme Truck Axle Has M. & S. Worm Differential

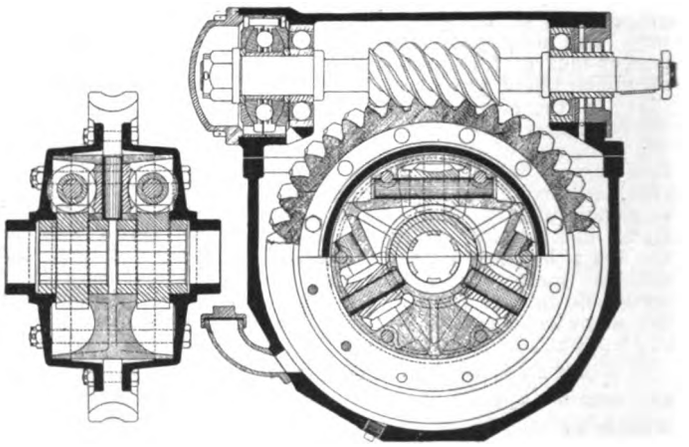


Fig. 1—Sections through gears in Acme truck axle, showing worm drive and worm differential

FEATURING the M. & S. worm differential with which it is equipped, the Acme worm-driven truck axle has been brought out by the Acme Motor Truck Co., Detroit, Mich. This axle is of the semi-floating type with a cast steel housing.

It is designed for a 2½ to 3-ton truck, with 36-inch wheels. The gear ratio is 7¾ to 1.

The housing is ribbed and is cast in one piece. It has cast brake spiders, bolted to the ends of the axle tubes. The worm-gear is mounted on a separate carrier, integral with the axle bowl cover and secured to the axle housing by six bolts. The entire axle runs on ball bearings. Two radial and one self-aligning single-row thrust bearings carry the worm. Single-row radial bearings carry the differential and double-row bearings support the outer ends of the axle shafts.

The axle shafts are of chrome vanadium steel ground and heat-treated. There are flanges inside the outer bearings and the inner ends of the shafts are splined.

Brakes are of the side-by-side internal type, their feature being that they contact with the drum on its entire circumference, saving the small space occupied by the actuating cams. The brake-shoes are semi-circular, sliding on pins, and each brake is actuated by two cams, at top and bottom, applied simultaneously by a single rocker-shaft at the front of the housing. The cams are so shaped as to give increased leverage as they are turned.

With 3½-inch dual tires the axle gives a gauge of 62½ inches. Spring centers may vary from 32 to 38 inches. The driveshaft universal joint connection is a 1⅜-inch tapered spigot, with a taper of 1½ inch per foot and taking a ⅜-inch No. 29 Woodruff key.

IMPROVED MASTER CARBURETERS

Consistent with the poorer grades of gasoline which are now sold, Master carbureters have been changed in several important portions to adapt them to present requirements, although the fundamental principle and construction remains the same as before.

Master carbureters, made by the Master Carbureter Corp., Detroit, are of a purely mechanical type whose feature is a multiple-jet nozzle block or fuel distributer, whose spray is metered by the throttle. The action, as may be understood on reference to the illustration, Fig. 5, is that of progressive opening of the different jets in the distributer as the throttle is opened, so that at the lowest speeds only one jet is in action and as the throttle is opened the others come into play one by one until at full throttle opening all of the jets play.

This is accomplished by the position of the distributer just below the cylindrical throttle and the form of the throttle. This form is roughly fork-shaped, a slot being cut through its middle. The edges of this slot are such that the upper edge regulates the area of the outlet and the lower one, correspondingly controls the area of the inlet. These are so proportioned as to give somewhat of a Venturi action, so that the speed of the air at the jets is higher than elsewhere. The lower edge of the throttle is also so shaped that it serves to close all but one jet at its closed position and opens the others progressively as the throttle is opened in such manner as to preserve the correct proportions of fuel to air.

There are no air valves or springs and no adjustments, save that of a damper in the throat, which is Bowden-wire controlled by a lever on the steering column. This damper restricts the air intake to provide a higher suction and therefore a richer mixture, when needed.

Fuel feed is through a bore through the base of the nozzle block connecting with a conventional float-chamber. This float-chamber has a metal float and a sediment chamber at the bottom which is covered by a screen the full diameter of the chamber. Another cylindrical screen is placed in the passage from the float chamber to the nozzle block, serving to give the fuel a secondary strain-

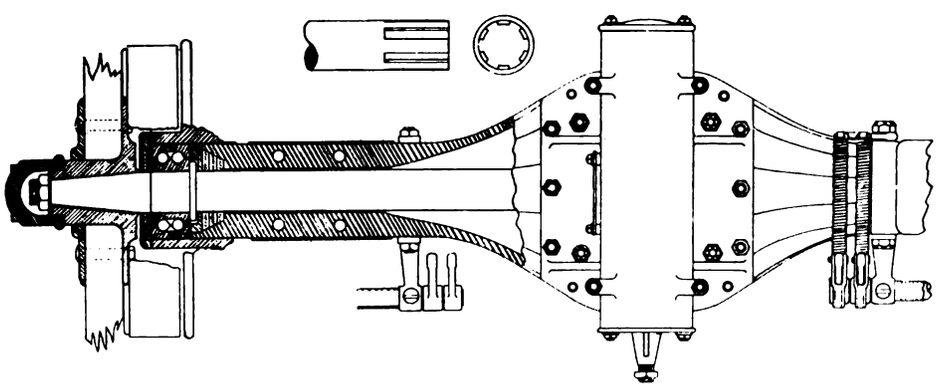


Fig. 2—Plan view of Acme axle, showing section of axle tubing and semi-floating wheel connection

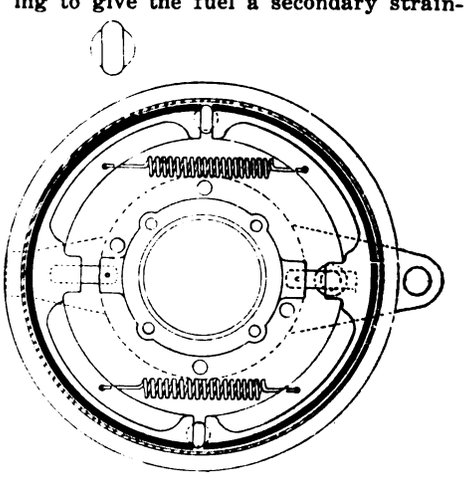


Fig. 3—Profile view of internal brakes, showing full contact

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ing. The latter screen may be unscrewed from the body and cleaned.

Changes in the design of the device comprise the substitution of a monel metal float needle-valve for the former brass one. Monel metal is harder than brass, and therefore should be less liable to give trouble due to wear at the point, such as would cause leaking and consequent flooding. A steel stamping has been placed in the float chamber to hold the float weights, screwed in from the top instead of the integral cast bracket formerly used. This member gives a finer adjustment and serves to lock the cover in place.

Formerly the air horn was provided with a divided inlet, giving part cold air and part heated air from a flexible tube communicating with a hot air stove on the exhaust pipe. In the new model all the air is taken from the hot-air tube. Cold air can be taken, if desired, however, by pulling out the hot-air tube slightly, opening a series of holes in the side of the tube.

Master carbureters were first designed for the use of distillate fuel, having originated in Los Angeles, Cal. They are especially adapted to this use.

LINDSAY WIRE TRUCK WHEELS

Wire wheels for motor trucks are an innovation being introduced by T. J. Lindsay, 708 Fletcher Trust building, Indianapolis, Ind. His wheel is of a new type, distinguished by the fact that it is made in two halves which bolt together. It combines demountable wheel, demountable rim and detachable rim features and is adapted to either pneumatic or solid tires. The wheel is not at present being manufactured, but Mr. Lindsay expects to make arrangements for its manufacture in the future. Patents have been applied for.

The wheel comprises two hub members, two rim members and wire spokes, independently attached to each half of the wheel. The spokes are laced, but not crossed. Hub types are made for floating, semi-floating or three-quarters-floating axle types and for demountable solid, or straight-sided or clincher pneumatic tires. The entire wheel is composed of sheet steel stampings and the wire spokes. The two sections are clamped together with bolts at the rims and by an axle nut at the hub.

The demountable hub fits the inner hub on splines and the rim sections are tapered inwardly. The wheel may be removed from the axle, the rim may be removed from the wheel by taking off the outer wheel section, or the tire may be detached from the rim, so that a spare

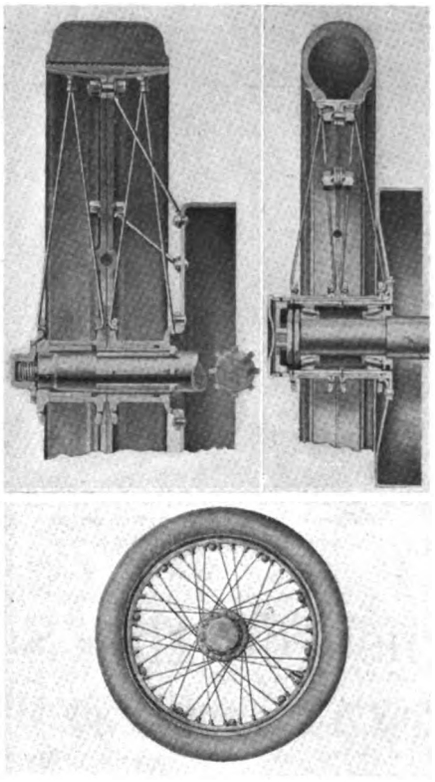


Fig. 4—Lindsay wire wheel types

wheel complete, a spare rim and tire or the tire alone may be carried, at the user's option.

Rear wheels differ from the fronts in that spokes are laced from the middle of the felloe section to the edge of the brake-drum to take the braking stress from the hub and transmit them direct to the felloe section.

MP INSULATED CABLES

Several forms of single and multiple cables in rubber, braid and armored coverings are manufactured by the Motor Parts Co., Philadelphia, Boston, Springfield, Mass., and Buffalo.

The simplest form is the rubber-covered primary ignition cable, made in but one size. This is also made with a braid covering. Another type, similar to the first, but heavier and having three layers of insulation is a rubber-covered high-tension magneto cable. A more elaborate type of ignition cable, intended for magnetos, is made with a greater number of strands of wire with braid covering.

Lighting cable in single and double types is made in triple-layer insulation with braid covering. Armored lighting cable is made in single, double, triple and quadruple types, armored with sherardized steel, nickel or brass flexible tubing with triple insulation.

A special type is for starting motor circuits to carry a very heavy circuit. This is of large size with a large number of wire strands and covered with double strands of braid and a rubber inner insulation.

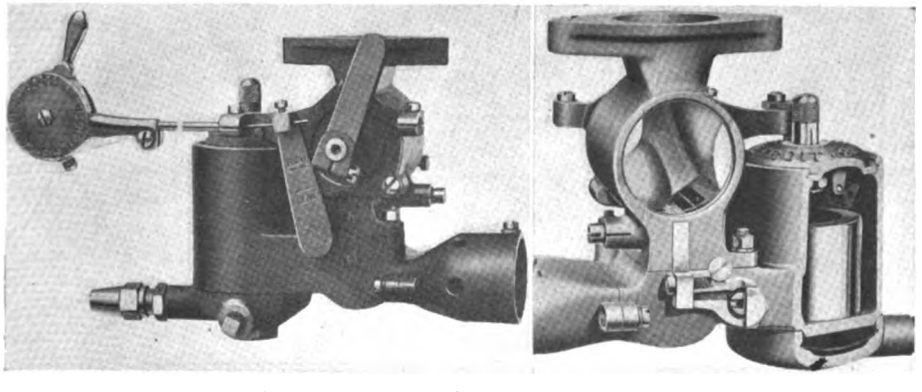


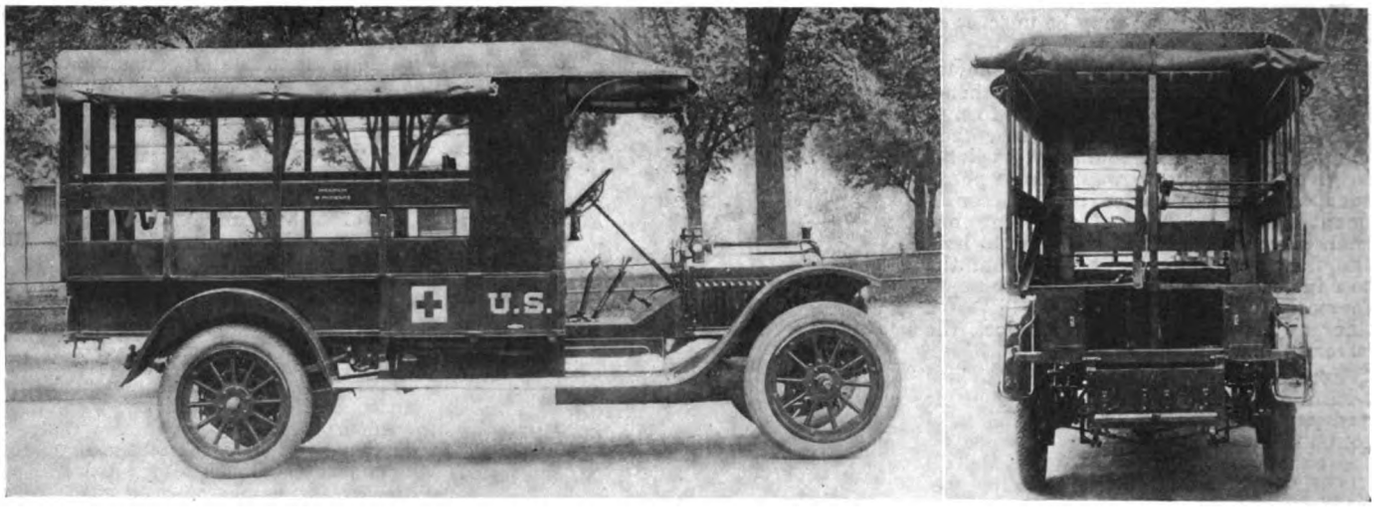
Fig. 5—Outside and partial sectional views of master carbureter

Motor Trucks Are Needed in the Straits Settlements, which include the towns of Singapore, Tenang, Dindings, Malakka, Province Wellesley and Labuan. Although there are at present very few commercial vehicles used in the Straits district, it is thought that an excellent opportunity exists to introduce motor trucks due to the great number of good roads. These are not only in the cities, but also connect the various centers, and would seem to offer splendid facilities for the use of motor trucks on the various rubber plantations and for general trucking in towns the size of Sangapore and Tenang. For the fiscal year ending June 30, 1915, the Government of the Federated Malay States extended $1,287,510 on road maintenance, bridges and the construction of new thoroughfares. During this period approximately 155 miles were constructed at a cost of $703,150. The average monthly wage of motor vehicle drivers is about $18. Tires cost approximately 15 per cent more than in the United States and general motor vehicle repairs are about 10 per cent higher. The price of gasoline is 54 cents per imperial gal. at the present time. For motor trucks the license for those vehicles not exceeding 2 tons weight is $17.03 per year; $22.70 for those between 2 and 3 tons and $28.38 when exceeding 3 tons. The foregoing are the license fees for vehicles with pneumatic tires on all wheels. For trucks not so equipped the charges are double. A list of Sangapore firms which now have agencies for motor vehicles and also those which, while not now agents but which might be interested in handling American motor vehicles, may be obtained from the Bureau of Foreign and Domestic Commerce, Washington, D. C., or from any of its district offices by referring to file No. 79316.

A Query Regarding Portable Electric Drills received by the Van Dorn Electric Tool Co., Cleveland, Ohio, was found to be from a prisoner in the Joliet, Ill., penitentiary. The original letter was addressed from a number of Collins Street in Joliet. The Van Dorn company answered it and followed it up by sending a special representative who found that the number given on Collins Street was the location of the Illinois penitentiary, and that the man who wrote the letter is on the institution's books as convict No. 7572. At the request of the warden, the Cleveland concern forwarded all the correspondence to him and he is now investigating to learn whether No. 7572 was a man thirsting for mechanical knowledge or whether he was planning a jail delivery with the drill.

Greatest Power Station in America is being built above Niagara Falls, N. Y. In the construction of this immense power plant six Federals are being employed by the Buffalo General Electric Co. When the plant is completed it will have 100,000 hp.

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Side and end views of standard U. S. Army ambulance body as mounted on one of fifty-four White ¾-tonners recently bought for service on the Mexican border

Odd Body Designs for the Sake of Efficiency

Standard Army Ambulance Body Much Improved

EVOLVED from limited experience on this side, but extensive observation of the types used in Europe, the army ambulance board has developed a standard U. S. Army ambulance body which represents what is considered the ideal design for this class of service.

These ambulance bodies are designed to be applied to any standard make of ¾-ton chassis and to run in companies of twelve, each company being accompanied by a repair truck. Recently four companies, or fifty-two vehicles, were equipped by the White Co., Cleveland, and sent to the Mexican border. The body design and the plan of organization were worked out by a board comprising Maj. Robert E. Noble, Maj. A. W. Williams, Maj. P. L. Jones and Capt. A. C. Christie.

Although much advanced in design and containing many improvements, this body is so planned that it may be built by any body builder.

It has the usual two longitudinal seats and is built on the general lines of a covered flareboard express body. It has a capacity for eight patients sitting and four reclining and carries a crew of one driver and one orderly. The seats are upholstered, the upholstery being attached to a separate board, hinged on its inner edge to the seat proper. This construction permits the two cushions to be swung inwards and down, where they meet, forming an elevated platform the full length and width of the body. On this two stretchers may be laid.

Above, there are spring supports on iron hooks which carry steel frames for two more stretchers. These have angle-iron guides at the sides into which the stretcher poles slide. They are hung on swivelled arms which, by pulling the framework backward may be swung down, so that the stretcher need not be lifted any higher than the lower platform, from which level, it may be slid forward and upward onto the frame. The frame may then be pulled backward again and swung up on the arms until in the elevated, horizontal position.

Beneath the seats are compartments for ten 1-gallon cans of gasoline and other supplies. Water tanks are located underneath and to each side of the front seat. A case is placed between the stanchions at the driver's right for first-aid medicines and dressings.

Ice Cream Body More Convenient and Sightly

NEAT appearance has been achieved in a type of body which is usually very unsightly, in the ice cream body designed for his own use by Howard B. Graham, wholesale ice cream manufacturer of Omaha, Neb. It has other advantages, too.

Most of the work by the men is done from the ground, standing at the side or rear of the truck; the goods is kept clean, since the men do not have to stand over it in their work, and the ice cream can also be gotten out of the body more quickly than in other types, thereby econ-



New design of ice cream body whose arrangement permits of quicker delivery and improved appearance

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omizing time. The entire body is inclosed, which enhances the cleanliness of the service, saves ice and improves the appearance.

The body is built of sheet iron, with cork insulation, and it eliminates at once the unsightly load of boxes, cans, ice and tarpaulins which are so frequently met with on the streets of any large city.

At the rear, toward which the metal floor slopes, there is a chute with a baffle door, from which ice may be taken with a shovel as desired, and a similar arrangement on a smaller scale is provided for the salt, thus disposing of the awkward shoveling of ice and salt while the man stands upon the top of the body or on the cans themselves.

Running boards 15 inches wide are provided for the whole length of the body on both sides, and cans are simply lifted from the tank to the running boards and thence to the ground, thus cutting this phase of the work to a minimum. A drain hose with a valve connection is attached to the bottom of the tank, and this is laid upon the ground to avoid splashing of salt water upon the body or chassis.



Chase 3-ton chassis carrying demountable tank on platform body

A half ton of extra ice on rush days may be carried in the collapsible bin on the top of the body, which folds within the trap doors when not in use. The whole body, made of iron and elaborately finished, costs but little more to construct than the ordinary truck body, says the inventor.

Combination Tank and Staked Platform Body

READILY demountable, the tank on a truck of which a number of duplicates have been made by the Chase Motor Truck Co., Syracuse, N. Y., permits the user to combine in one vehicle the functions of two. Many oil dealers find that they have not sufficient work for the entire time of both a tank and platform truck, so that to maintain one of each is extravagant. The demountable tank permits the truck to be used in the delivery of oil whenever needed, and for the haulage of other goods as required.

The chassis has a conventional platform body with sockets for stakes. When the tank is applied the stakes are removed. The tank is mounted on saddles and is fastened to the body platform by four tie bolts. There are hooks on the bottom cradle of the tank, so that it may be lowered onto or lifted off the platform easily by means of a crane and a set of chains. The tank is entirely self-contained, so that when removed, all faucets, etc., come with it.

Built of steel, the tank has three compartments, used for kerosene, gasoline and lubricating oil. In addition to these partitions, there are perforated baffle-plates to prevent the surging of the liquids in response to acceleration and braking stresses in the truck.

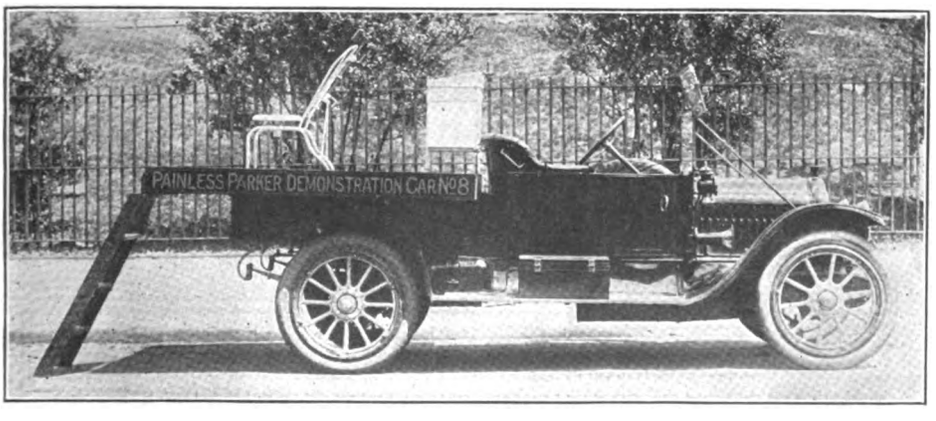
On each side of the tank is a space wide enough to carry filler cans or cans of oil and a small chain railing is provided to retain such accessories. This side ledge and its railing are attached, with the draw-off pipes to the cradle of the tank, and all lift off with it.

All told the tank holds 1,000 gallons. It is mounted on a 3½-ton Chase chassis with Smith steel wheels.

Dental Demonstration Dais on Truck Chassis

PAINLESS PARKER is perhaps the most famous dentist in America. His fame is largely based on clever advertising, which has brought him a fortune. In order to convince the skeptical that it is possible to extract teeth and do other dental work without torturing the patient, Dr. Parker has sent out a number of demonstration cars which frequent the busy streets and serve as portable outdoor dental laboratories where glib and skilled dental surgeons conduct clinics for the sake of demonstrating their mastery over pain.

One of these cars—No. 8, it is called—is illustrated herewith. It is a White ¾-tonner fitted with a platform body and a fore-door runabout-type driver's seat. A white enamel dentist's chair and an instrument cabinet of like material are securely mounted on the platform and a flight of detachable stairs is attached to the rear end.



Demonstration vehicle used by famous painless dentist for advertising

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Rescuing Cotton from a Flood, a new Federal, purchased just 10 days previous to the overflow of the Catawba River at Mount Holly, N. C., nearly paid for itself in 24 hr. It was the property of C. E. Hutchinson. When the river began to rise it was set to work moving bales of cotton to high ground and safety, and in 24 hr. saved several hundred bales. When the flood came the cotton mills, stores and warehouses were swept away, and then the Federal was put to work cleaning up the debris and hauling materials for their reconstruction. The truck also serves as the only means of transportation for the help between the mill and the town, 4 miles away.

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Men and Makers



STEGEMAN Motor Car Co., Milwaukee, Wis., maker of Stegeman motor truck, is contemplating the erection of a new factory building 100 by 200 ft., to be used as the main erecting department. It will also erect an office building 60 by 60 ft. Both of the structures will be of concrete block and will have saw-tooth roofs. It is expected these two new additions will enable the Stegeman company to increase its annual capacity to between 1,200 and 1,500 trucks.

The New York Salesroom of the Willys Overland Co., at the corner of Broadway and Fiftieth street, was opened on Tuesday, Nov. 28. The structure is three stories high and has a frontage of 100 ft. on Broadway and 103 ft. on Fiftieth street. The main floor is to be used for display purposes of the company's passenger car models and the second floor for the delivery designs. The third floor will be devoted to the sale of motor vehicle accessories, including various types of mechanical devices, gloves and other supplies.

Stegeman Motor Truck Co., Milwaukee, Wis., has opened a branch at Boston, Mass., taking salesrooms in the same building with the Abbott & Downing Co., Concord, N. H., which is marketing the Concord truck.

Abbott Downing Co., Concord, N. H., has opened a branch at Boston, Mass. It has also made a change in the firm name, so that it now is the Abbott & Downing Co. The company has named its vehicle the Concord, after the New Hampshire city where it is made.

Van Cortlandt Vehicle Corp., New York City, has been formed in that city to act as distributor for Peerless motor trucks and passenger cars in New York City and the adjacent territory. Walter Woods, general manager of the new concern, has been identified with the sales of Peerless vehicles for several years, first with the factory branch when it was operated in New York and later as a sales executive at the Cleveland plant of the company.

R. E. Taylor Corp., Garford agent, has moved into its new sales and service station at Commonwealth avenue and St. Paul street, Boston, Mass. It is one of the largest motor structures in New England, and the largest devoted exclusively to truck sales.

D. E. McCann's Sons, Portland, Me., agents for the Smith Form-A-Truck, have secured J. A. Lamkin as sales manager.

Packard Motor Car Co. of New York, which controls western Massachusetts, with headquarters at Springfield, Mass., has just opened a branch at Pittsfield. James M. Downs has been placed in charge of it.

Remy Electric Co., Anderson, Ind., another of the units forming the United Motors Corp., New York City, has broken ground for a factory building to be devoted entirely to its women employees. The structure will be used in the manufacture of small parts at which women are particularly adept. The new structure will contain every convenience for the transfer of material, so that no lifting need be done. The interior will be painted snow white and there will be several rest rooms, the intention being to make the building as attractive as it possibly can be made.

New Departure Mfg. Co., Bristol, Conn., one of the concerns which make up the United Motors Corp., is erecting 102 houses which will be homes for its employes. It is also remodeling the Bristol hotel which it recently purchased for the accommodation of its unmarried men employes.

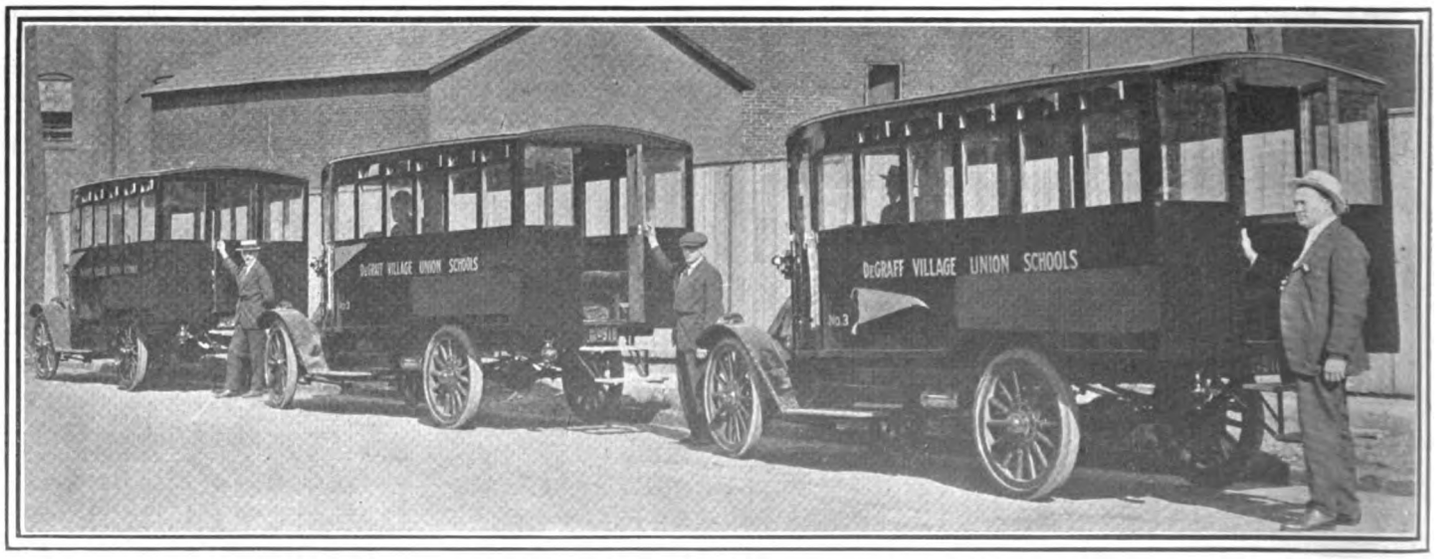
Fuller & Sons Mfg. Co., Kalamazoo, Mich., maker of motor truck gearsets and clutches, is planning the erection of a new addition to its plant, which will practically double its present output. The new structure will be 60 by 180 ft., four stories in height, and will be made of reinforced concrete, using the flat-slab construction.

Troy Trailer Sales Co., a subsidiary concern to the Troy Wagon Wks. Co., Troy, Ohio, maker of Troy motor truck trailers, has been formed to sell Troy trailers made by the parent company. Those forming the new concern are C. A. Geiger, C. N. Peters, G. R. Harris, R. C. Sykes and H. H. Tamplin.

Willard Storage Battery Co., Cleveland, Ohio, plans to erect a new two-story plant 135 by 200 ft. at 280 East One Hundred Thirty-first street in that city. It has also taken out a permit for interior improvements in its present plant.

Troy Motor Truck Trailers will be handled in New Orleans, La., by the O'Rourke-Muller Motor Co., in the same city. The O'Rourke-Muller concern has arranged with the Troy Wagon Works Co. to carry a complete line of the various Troy trailer models manufactured. The arrangements were completed through the efforts of Isaac S. Buyrum, special representative of the Troy company.

Troy Motor Truck Trailers, made by the Troy Wagon Works Co., Troy, Ohio, will be handled in the Houston, Tex.,



The school children living in the rural communities between Akron and DeGraff, Ohio, are now getting to school each morning in much less time than it ever took before. The reason is that the three I. H. C. buses shown in the above illustration have replaced the slower horse conveyances formerly used. The new vehicles are equipped with large well-ventilated bodies which are kept warm in the winter time by utilizing the heat of the motor exhaust gases. The seats run the full length of the body on each side with the exception of space for the driver on the left side. Between these longitudinal seats there is a lower and narrower seat for the smaller children. The vehicles were recently delivered to the school authorities from the Akron plant of the International Harvester Co., and are equipped with Firestone solid tires

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and adjacent territory by the Barden Electric & Machinery Co. The latter concern's headquarters are at Houston and it maintains branches at Beaumont, Galveston and San Antonio.

Cutler-Hammer Mfg. Co., Milwaukee, Wis., manufacturer of motor truck accessories, especially those for electric commercial vehicles, has begun work on the erection of a new administration building, laboratory and general industrial structure to cost $150,000. The building will be 283 ft. long and 50 ft. wide, six stories and basement, and will be of fire-proof construction throughout. It will be ready for occupancy May 1, 1917.

Kelly-Springfield Tire Co., New York City, will set its engineers at work in the near future on the plans of the company's new plant at Cumberland, Md. The factory will cover about 75 acres and ground will be broken for the buildings early next spring. It is expected that the capacity of the present plant will be increased 400 per cent when the new factory is completed.

Goodyear Tire & Rubber Co.'s branch at Worcester, Mass., is expected to be closed about Jan. 1 and the Goodyear products will be sold through dealers there from that time on.

Donald C. B. Van Duzen, formerly of Knoxville, Tenn., has been appointed southern district manager for the International Motor Co., New York City. He will make his headquarters in New York and will have charge of the sales of Mack and Saurer trucks in the territory comprising the states of Georgia, Louisiana, Mississippi, Alabama, Florida, North Carolina, South Carolina and Tennessee. Just one year ago Mr. Van Duzen became a dealer for the International company's trucks in the territory surrounding Knoxville, Tenn. During the past year he has proven so successful in handling the company's product that he has risen to a position of prominence in the International concern and has charge of the sales work in eight important southern states.

J. H. Whitmore, formerly with the Northway Motor Co., Detroit, has become identified with the sales force of the Vim Motor Truck Co., Philadelphia, Pa.

E. J. Travers, formerly identified with the Chicago *Herald*, has become advertising manager of the Nash Motor Co., Kenosha, Wis.

D. F. Shanahan of Covington, Va., has joined the sales force of the Chase Motor Truck Co., Syracuse, N. Y., as a special traveling representative.

G. E. Smith has recently been appointed sales manager of the Blair Motor Truck Co., Newark, Ohio. He succeeds F. L. Swanberg. The company's factory is in charge of J. P. McCune and F. O. Spaulding.

J. R. Kinsey has just been appointed retail sales manager for the New York City branch of the General Motors Truck Co., Pontiac, Mich. He had previously been doing special work for the General Motors company, so that his appointment is in the nature of a promotion.

A. B. MacGowan has been appointed city sales manager of the Philadelphia, Pa., branch of the Chase Motor Truck Co., Syracuse, N. Y. He was formerly identified with the sales department of the parent company in Syracuse.

F. E. Dennison has joined the sales department of the Hartford, Conn., branch of the Packard Motor Car Co. of New York, and will manage the used-vehicle department of that concern.



Equipped with a power winch to pull itself or other trucks out of mudholes or bogs, the semi-chassis views of the Jeffery Quad shown above depict one of several such vehicles designed as auxiliary trucks for the United States motor transport trains in use in Mexico and along the border. The feature of the truck is a power winch on the frame at the rear. This has two capstan heads, one on either side. The body fitted on the completed truck is made of steel. It is 10 ft. long, 40 in. wide and 32 in. deep, and is fitted with wide running-boards on each side, strong enough to carry a considerable outside load. Besides the winch, the equipment consists of 300 ft. of wire cable ,100 ft. of manila rope, an oxy-acetylene welding outfit, a hand-operated derrick, a workmen's bench, and tools, including shovels, axes, crowbars, pickax, sledge hammers, gin poles, tow chains, wheel and flange pullers, clamps, files, and a Pyrene fire extinguisher. In pulling itself out of a hole, the 100 ft. of rope is secured at one end to a convenient tree or stake buried in the ground. The other end is wrapped a few times around one of the capstan heads and given the necessary grip by three or four men who hold the rope taut and haul off the slack as the winch rotates. In this way the truck pulls itself along the rope to safety. Sometimes two ropes are used, as pictured above. When the truck is used to extricate another, it is first stationed a convenient distance away, the hand-brake lever set, thus locking all five brakes, and a couple of sprags at the rear end pushed into the ground to keep the truck stationary. The steel cable is then hooked into the stalled vehicle and the winch started, winding up the cable until the truck has been pulled on solid ground

Horace N. Trumbull has recently been appointed advertising manager of S. K. F. Ball Bearing Co., Hartford, Conn.

M. S. Dennet has resigned as chief inspector of the Packard Motor Car Co., Detroit, to represent the Muskegon Motor Specialties Co. and the Ajax Forge Co., in Detroit.

Frank N. Sim has been appointed manager of the advertising department of the Timken-Detroit Axle Co., Detroit, and W. H. Taylor performs a similar duty for the Timken Roller Bearing Co., Canton, Ohio. Previously the advertising work of both of these concerns had been handled by a common department, but the advertising matter has recently increased to such extent that it has been decided to create separate departments for the axle and roller bearing organizations.

John H. Hammes, vice-president of the Sewell Cushion Wheel Co., Detroit, has just returned to the factory from a week's inspection of the Cincinnati, Ohio, branch of the same company.

Frederick E. Boylan, factory representative for the Sewell Cushion Wheel Co., Detroit, has just returned to the factory from the Columbus, Ohio, branch of the same concern.

John Kearns has recently been appointed general manager of the Lee Tire & Rubber Co., Conshohocken, Pa. He was formerly head of the research department of the Fiske Rubber Co., and was one of the organizers of the British Dunlop Co. of Australia.

Louis Ruthenburg has been appointed general superintendent of the Dayton Engineering Laboratories Co., Dayton, Ohio, succeeding W. P. Anderson, resigned to enter business for himself.

A. R. Ruggles has been appointed factory manager for the United Motors Co., Grand Rapids, Mich., maker of the United truck.

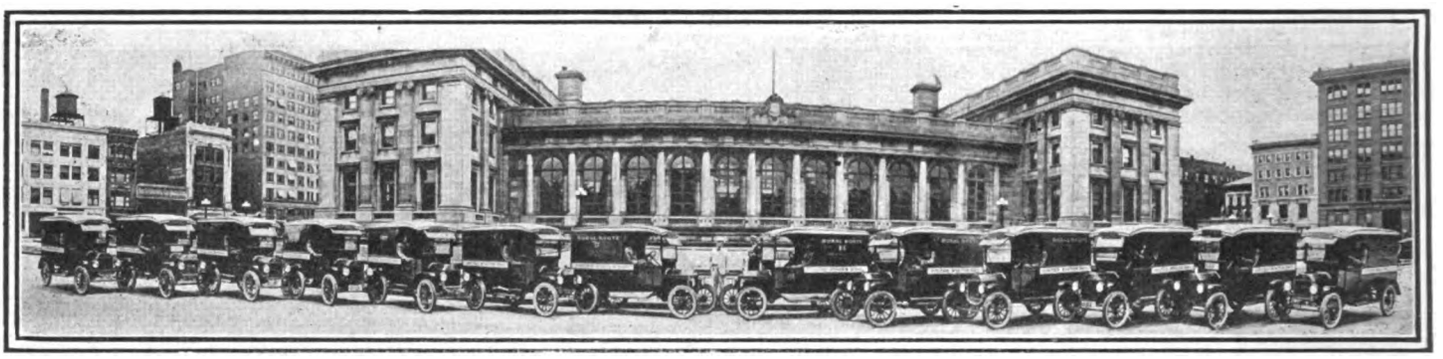
R. W. Llewellyn has been appointed manager of the Columbus, Ohio, branch of the Kelly-Springfield Tire Co., New York City. Mr. Llewellyn has been connected with the Harris-Llewellyn Rubber Co. for the past 5 years.

Edward Duffy has become identified with the organization of the Kelly-Field Co., merchandizing Lee tires. Duffy was formerly manager of the Midgeley Tire & Rubber Co., and before that was connected with the Hartford Rubber Wks. Co.

L. G. Fairbank has succeeded D. C. Swander as eastern district manager of the Firestone Tire & Rubber Co., Akron, Ohio. Mr. Swander has been transferred to Boston, Mass., to become manager of the Firestone branch in that city. Mr. Fairbank has been assistant advertising manager of the Firestone concern for the past 3 years.

Coal at Cost is being supplied by the Goodyear Tire & Rubber Co., Akron, Ohio, to its employes, many of whom have been unable to obtain sufficient coal for their immediate needs due to the

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Another step toward the eventual motorization of the rural free delivery mail routes throughout the United States is shown pictorially in the above illustration, which depicts sixteen Fords equipped with special mail bodies which were recently put into service at Indianapolis, Ind. These vehicles have taken the place of double the number of horses and wagons. They cover 50 miles per day or twice that formerly served by the horse conveyances. In addition, they cover the doubled mileage in less time than the horses took to negotiate the 25-mile routes, thus saving considerable time, and also money. The bodies, which were made by the Parry Mfg. Co., Indianapolis, are provided with special compartments for simplifying the mail routing, and others for stamps, post cards, money and parcel post packages

present shortage of freight cars. It is the Goodyear company's intention to continue the plan until the present shortage is relieved.

Gilbert S. Craven, for some years with the Miller Tire Co.'s branch at Boston, Mass., has been appointed manager of the New England district by the Norwalk Tire & Rubber Co.

"Bearing on Bearings, Vol. II," has just been published by the Gurney Bearing Co., Jamestown, N. Y. Although the booklet has a black appearance due to the use of a wide ornamental border on each page, it is originally made up in that first the complete ball bearing and then the assembled parts of the inner and outer races, the cage and the balls are treated separately, the particular part being shown in a halftone illustration on the left-hand page and a description of it appearing on the opposite right hand page.

"United States Truck Tires" is the title of a four-color booklet just issued by the United States Rubber Co., New York City, in which United States solid truck tires are described, both as to construction and their method of manufacture. The booklet is well illustrated by cross-sectional views of the various shapes of tires offered and the types of vehicles on which they may be fitted.

Remy Employes' Electrical Course, instituted recently by the Remy Electric Co., Anderson, Ind., is said to be the only one in which a manufacturing concern is working in co-operation with a high school in teaching the elements of electricity. The school has at present a membership of over 400. It meets three nights a week and its benefits may be secured by Remy employes, young men and young women in the Anderson high school or anyone else interested in the opportunity of securing a practical training in electricity. The Remy company furnishes the text books at cost and pays the salary of the instructor.

"Edison Storage Batteries for Mercury Industrial Tractors" is the title of an eight-page brochure, just issued by the Edison Storage Battery Co., Orange, N. J. The booklet shows the familiar Edison storage battery and its method of application to the Mercury industrial tractors. The construction of the latter is also shown in full together with the several illustrations showing it engaged in various kinds of work in factories, at docks and wharves, in lumber yards and on platforms in railroad terminals.

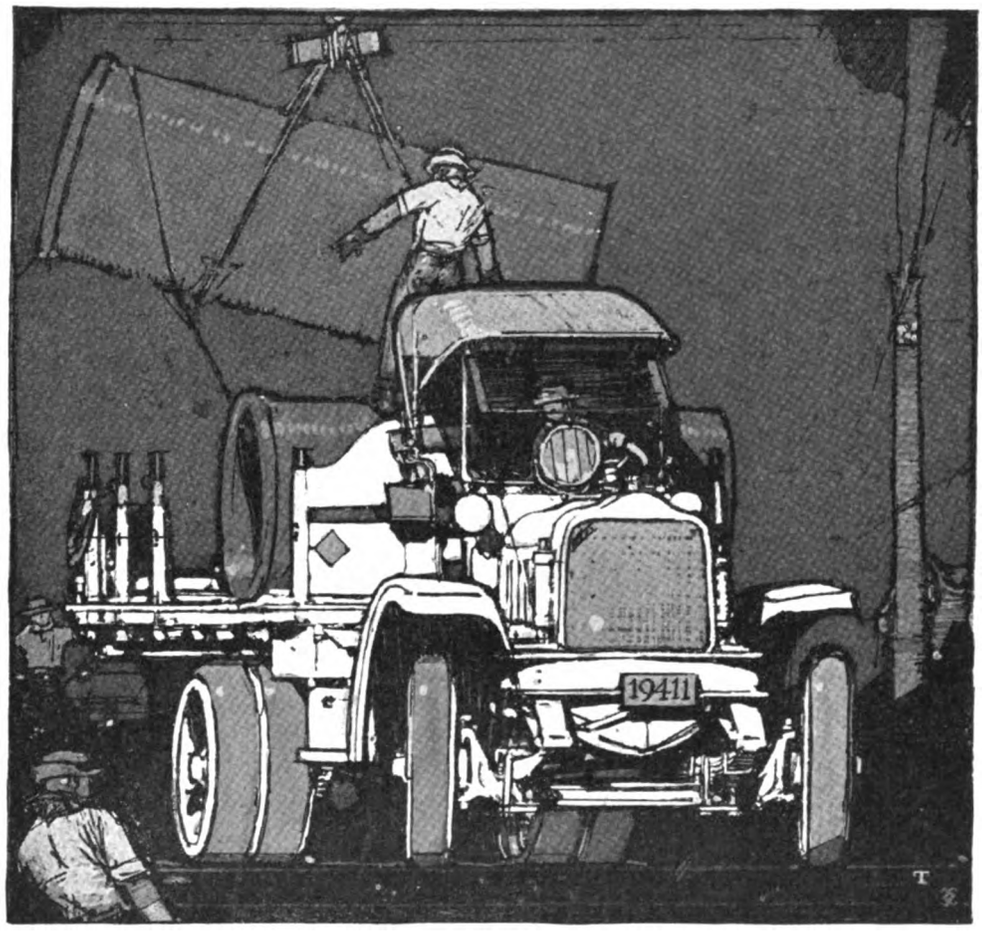
"The Quieterion" is the title of a new monthly house organ published by the Hyatt Roller Bearing Co., Detroit, and dedicated to things that are quiet, according to its editor, B. G. Koether. The initial issue, which is dated November, contains fourteen pages of reading matter and two advertisements of Hyatt bearings. The reading matter may be characterized somewhat as uplift literature in which the editor seeks to make the Hyatt employes endeavor to better their positions by making most of their opportunities.

"The Ford in Business Service" is the title of a forty-eight-page booklet just issued by the Ford Motor Co., Detroit, in which are given some very interesting facts as to the utility and economy of the Ford car in business service. It is very well illustrated and gives short descriptions of the use of Ford cars for salesmen, contractors, druggists, governmental and municipal authorities, manufacturers' agents and wholesalers, meat packers, oil companies, public and private service corporations and retail service of a miscellaneous nature. It gives many examples of the economy effected by salesmen using Ford runabouts either with or without rear-deck bodies to carry samples as compared with the former method of the salesmen in using the railroads or street surface lines to get from point to point. It is pointed out that there are two principal methods for the use of Ford cars by salesmen. First, the company to buy and own the vehicle, allowing the salesman a certain amount monthly for the expense of its operation. The second plan allows for the salesman buying the car outright and being given a certain amount monthly to cover its cost of operation. Still another method is for the company to buy the car and re-sell it to the salesman on monthly installments, at the same time allowing a certain amount monthly for operating expenses. In connection with the use of Ford cars by salesmen it is stated that the Loose-Wiles Biscuit Co., calculates the expense of the Ford cars used by its salesmen to be approximately equal to that previously spent in railroad fares, but with an increase in business in the normal season of about 35 per cent. Many short tabulations giving the cost of operation of Ford delivery vehicles in various classes of work are given with the comparative costs of delivery by horse and wagon before the Fords were purchased. Such figures invariably show a substantial saving effected by the use of motors. The booklet also contains many illustrations showing how owners of Ford delivery vehicles have made good use of the advertising possibility of the vehicles by means of specially designed and sometimes unique bodies. In summarizing, it is stated that the average operating costs of Ford delivery cars will not greatly exceed 2 cents per mile, exclusive of depreciation. It also points out that the care given a vehicle by its driver has a very important and direct bearing upon the operating expense, and cites a case where a Ford delivery vehicle driven by one salesman cost $361 to maintain for 6 months and only $171 for the following 6 months when operated by a different man. Specifications of the Ford chassis, which sells for $325, f.o.b. Detroit, are also given in full. The Ford Company does not manufacture commercial bodies of any kind, but simply sells the stripped chassis so that the purchaser may apply that body best suited to his needs.

Motor Trucks in Use on the Ripogenus Dam proved more efficient in the haulage of the dam materials than the railroads. The Ripogenus Dam is in the State of Maine, and before its construction was started the contractors estimated the comparative cost of hauling the material by horses and wagons, by railroad or by motor truck during the 2-year period of construction. These estimates indicated that the cheapest method would be by motor truck and that the saving would be sufficient to permit the building of the macadam road over which to run the vehicles. As a result the contractors adopted the motor truck and built the macadam road for its use. After the dam had been completed and the cost of the actual motor truck work determined it was found that the estimated cost and the actual cost agreed almost to the last dollar.

Two Little Giant Motor Trucks, made by the Chicago Pneumatic Tool Co., Chicago, pay their own expenses. They are owned by a sausage concern which makes daily deliveries to merchants in several suburban manufacturing towns outside of Chicago. The truck owner has arranged with several factories in the latter towns to stop at their plants on the return trips of the trucks and pick up small special delivery orders for the Chicago customers of the factories. It takes about 30 minutes longer for each truck to handle this express business, and it is found that the income from it practically pays each truck's operating expenses. As a result, the sausage maker has been able to reduce his prices somewhat and to obtain considerable additional trade which he could not secure previously. In addition the concern is able to make daily deliveries to its suburban customers, as against twice-a-week service, which was the best it could do with horses and wagons.

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More White Trucks are put into service each year than trucks of any other make.

It is a significant fact that the majority of these trucks are purchased in fleets by large motor truck owners whose only criterion of value is performance in terms of eventual cost.

THE WHITE COMPANY
CLEVELAND

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Kelly-Springfield Sectional Block Tires



No skidding on wet asphalt, no lost traction on slippery, muddy roads when Kelly-Springfield Sectional Block Tires grip the surface.

Kelly-Springfield Tire Company, Akron, Ohio

Branches in all principal cities

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STUDEBAKER

Commercial Cars



This is another of the Studebaker Commercial Cars—the one-ton Stake Truck at $1350.

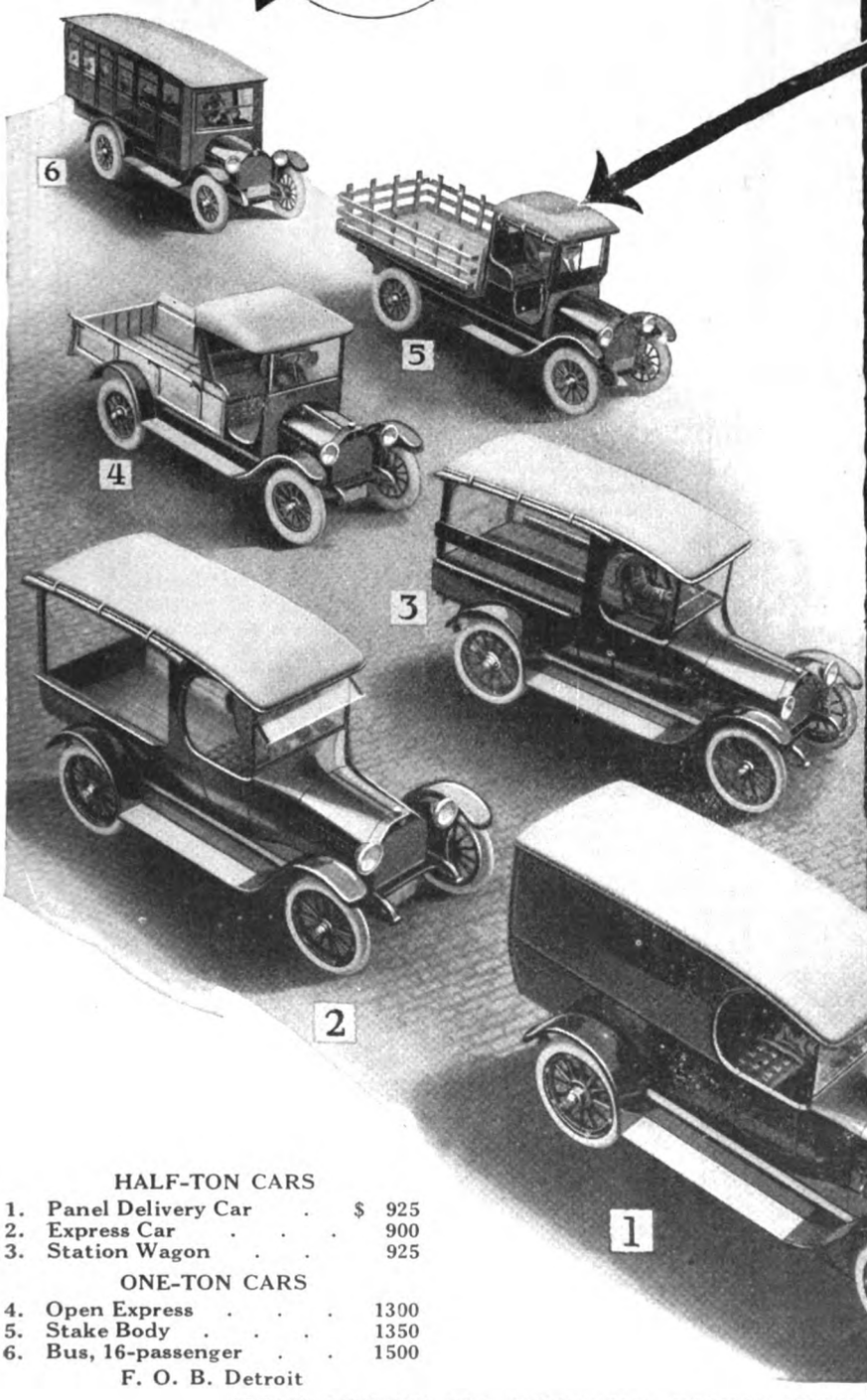
Rapid transportation facilities from freight depots and steamship wharfs to store or warehouse headquarters, presents a big problem to many merchants.

Furthermore, quick deliveries of heavy material that may be bulky or too large to carry economically over routes ordinarily taken care of by cars of smaller capacity, may be handled with speed and economy by this type.

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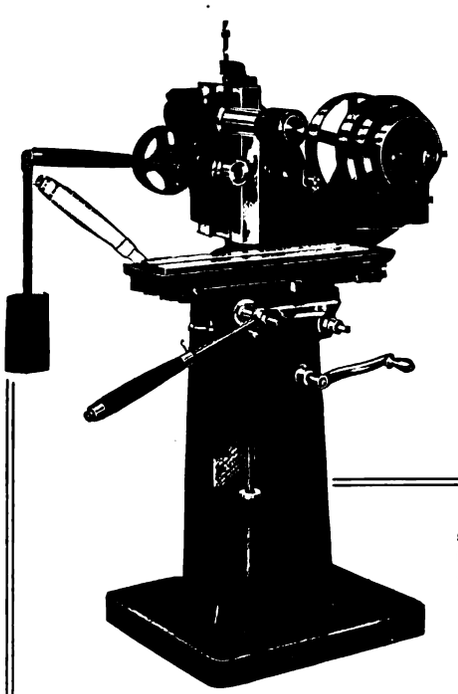
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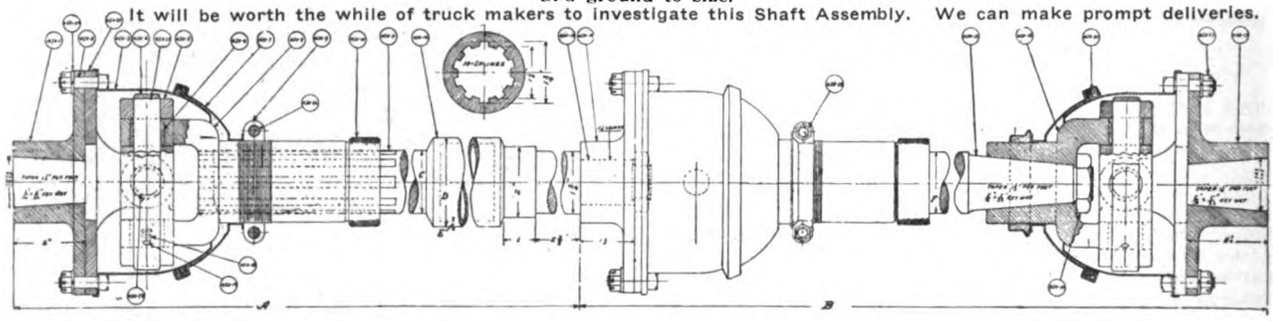
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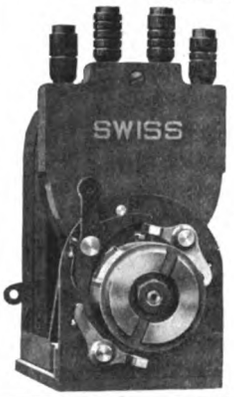


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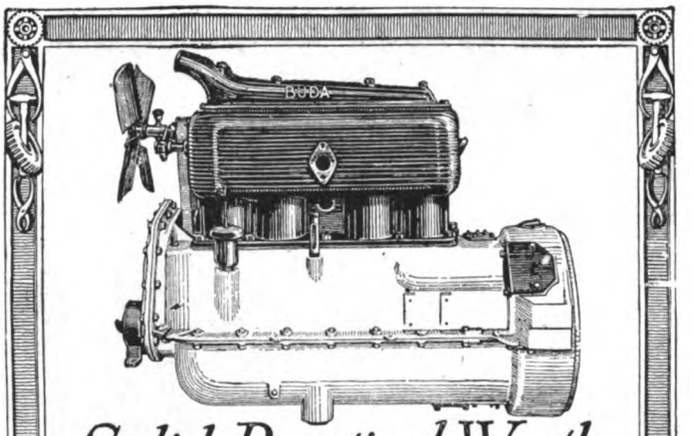
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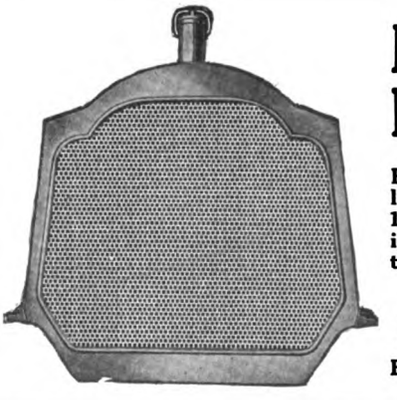
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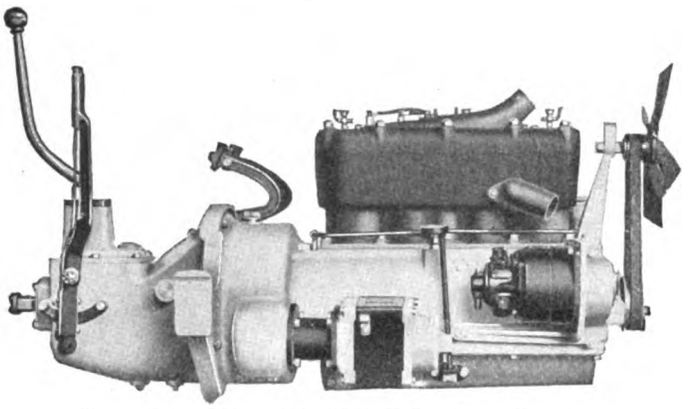
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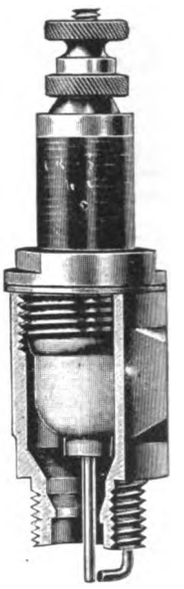
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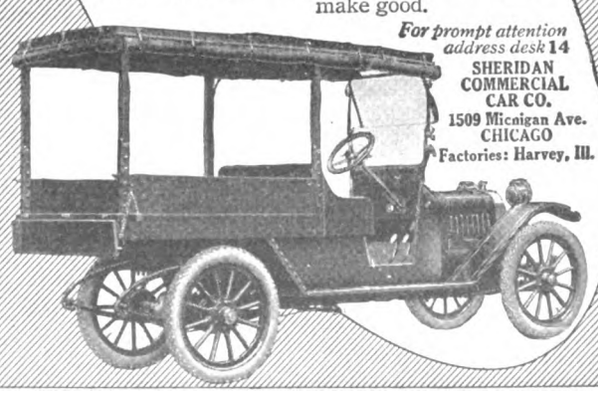
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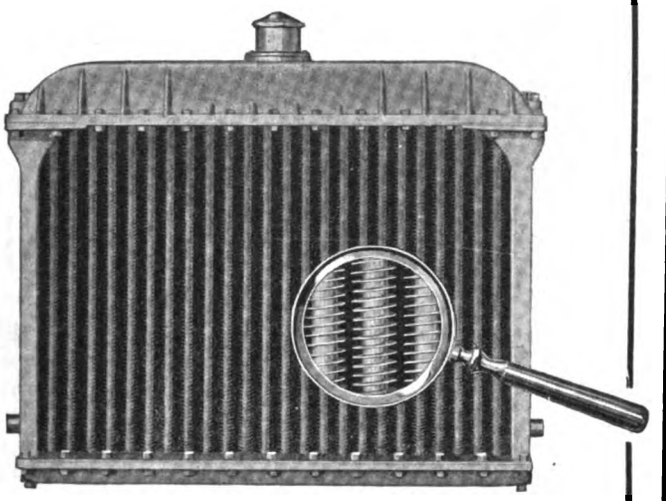
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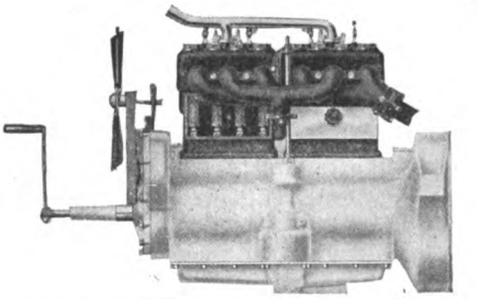
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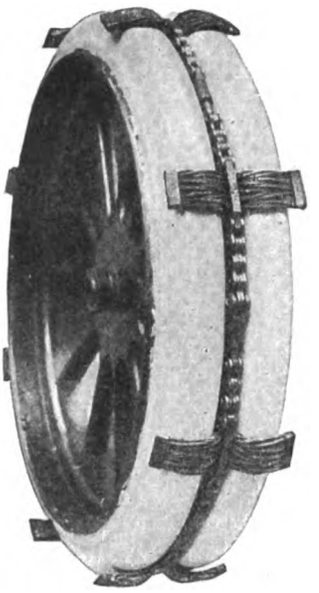


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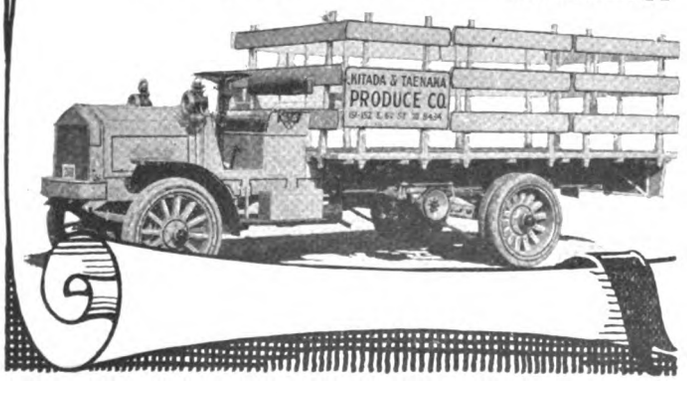
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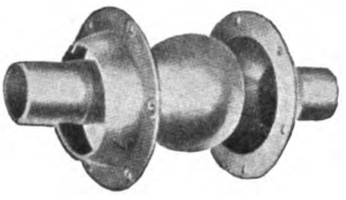
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CHICAGO PNEUMATIC TOOL COMPANY
1085 Fisher Bldg. CHICAGO
52 Vanderbilt Ave. NEW YORK
Branches and Service Stations Everywhere

BOSSERT

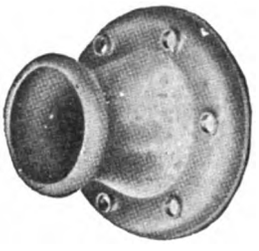
In the most perfect plant that brains, money and experience could devise, we have the men and equipment to produce pressed steel parts in any quantity on comparatively short notice.



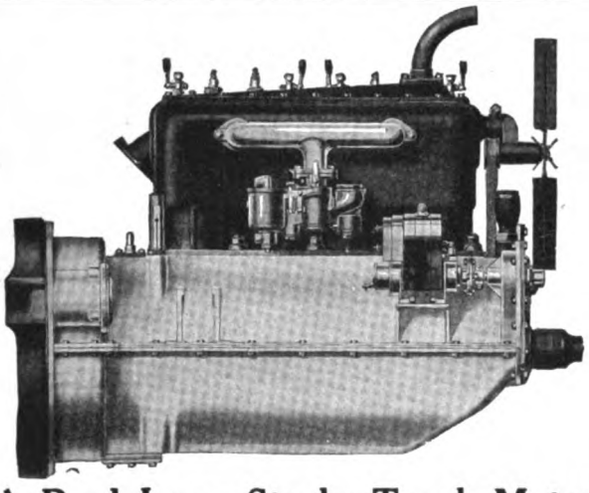
We make more than 200 pressed steel parts and you can make your vehicles lighter and at lower cost, without sacrificing strength if you use *pressed steel* spring hangers, running boards, brake drums, etc., instead of malleable iron, steel castings and drop forgings.

"THE BOSSERT WAY"

stands for the prompt delivery of your order filled in accordance with every item of the specifications.



The Bossert Co.
UTICA
N. Y.



A Real Long Stroke Truck Motor

Type T U, 4 x 6; Type U U, 4½ x 6; cylinders interchangeable. Crankshaft, four bearing, chrome nickel steel, 2 in. diameter. Bearings, bronze, Fahrig metal lined. Camshaft, one piece, cams integral. Oiling system, force feed, hollow crankshaft.

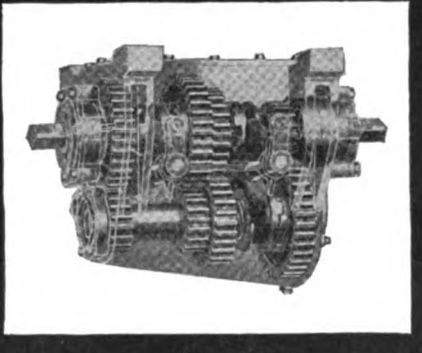
WRITE FOR COMPLETE SPECIFICATIONS.

WISCONSIN MOTOR MFG. COMPANY
Station A, Dept. 319 MILWAUKEE, WIS.

New York Branch: 50 Church Street. T. M. Fenner, Factory Representative. Pacific Coast Representative: Earl P. Cooper Co., 1428 Bush Street, San Francisco; 333 West Pico Street, Los Angeles.

Wisconsin
CONSISTENT Motors

COTTA TRANSMISSIONS

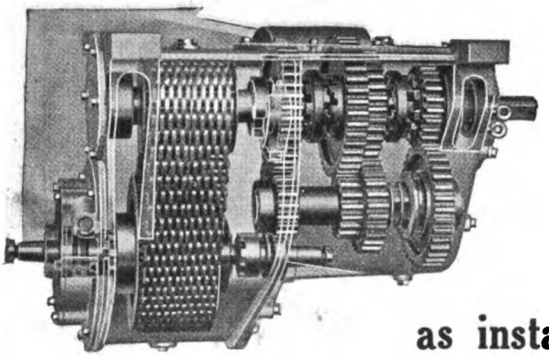


All Gears Always in Mesh

An Assurance of Dependable Service

The Cotta Transmission Co.
Rockford, Ill.

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In this special type of transmission as installed in the F. W. D. one and one-half, three and five ton trucks -:- -:-

NEW DEPARTURE BALL BEARINGS

American Made for American Trade

are used exclusively

Many of these vehicles are now serving at the Mexican border fitted up as traveling workshops, water tank wagons and for hauling supplies.

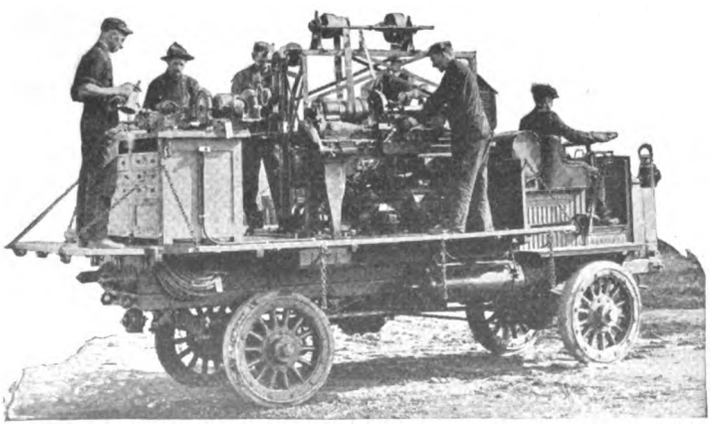
Under the exceptionally severe conditions of operation, to which the ten New Departures are thus put in this transmission, they have never failed in promoting maximum efficiency of the unit in which they are installed and they have also proven a mighty factor in the dependable service of these trucks as a whole.

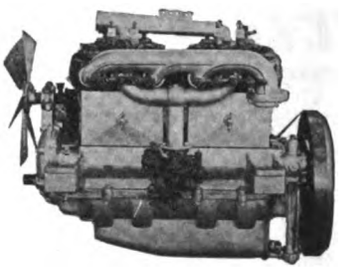
THE NEW DEPARTURE MFG. CO.

BRISTOL, CONN., U. S. A.

Conrad Patent Licensee

Western Branch: 818-20 Ford Bldg., Detroit
Distributors in Trade Centers throughout the United States
Sole British Agents: Brown Bros., Ltd., London and Manchester
For Continental Europe: Jacob Holst, Copenhagen, Denmark.





Beaver Motors Make Their Way By The Way They Are Made

BEAVER MOTORS are made by truck motor specialists. The concentrated experience of engineers of international reputation is embodied in their construction.

BEAVER TRUCK MOTORS are made by men who make nothing but motors—who, by doing the same thing over and over have become masters in perfection. That is why we can make truck motors better, quicker, and at less cost than the truck manufacturer himself.

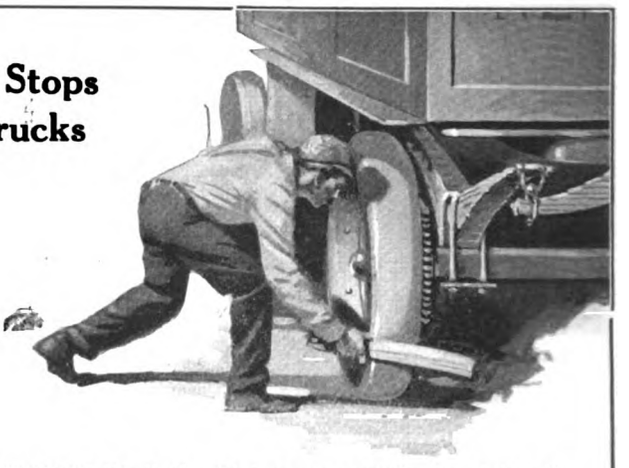
We make truck motors of all sizes, for all requirements. No matter whether you are building a 1,500 pound light delivery wagon or a 5-ton truck, we can meet your demands for power, economy and dependability.

Do not determine on a motor for your truck till you have sent us your specifications

BEAVER MFG. COMPANY

Milwaukee Wisconsin

It Stops Trucks



THERMOID Brake Lining stops trucks by giving the brakes a sure-as-death gripping power—the grip of a steady friction that never lets go.

Thermoid means safe stopping this side of the smash-up, this side of the suit for damages, this side of criminal negligence.

Thermoid HYDRAULIC COMPRESSED Brake Lining - 100%

Thermoid is friction (gripping-power) through every particle, from surface to surface. It has superlative weight of raw materials; of long fibre Canadian asbestos spun on brass wire and impregnated with friction compound. It is folded and stitched and welded under hydraulic pressure into one solid mass.

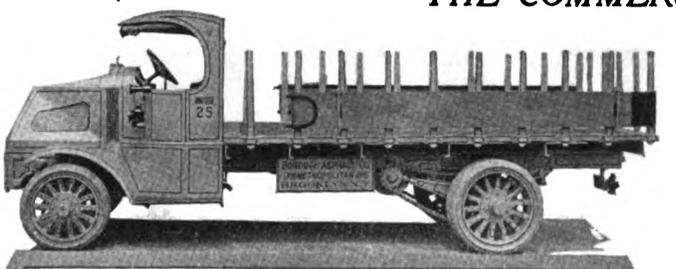
OUR GUARANTEE

Thermoid Brake Lining is absolutely guaranteed to give more satisfactory results and to outwear any other lining manufactured. Not affected by heat, oil, water, gasoline or dirt.

Thermoid Rubber Company

Trenton, N. J.

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Mack

"AC" TRUCKS

THE success of our latest Mack truck is unprecedented both in point of volume and economy of operation.

Our Boston representative reports that new Mack models have been on the road for 20 months, covering more than 25,000 miles under extreme load and road conditions. No owner has yet been obliged to repair even a main or connecting-rod bearing.

Such service is typical of Mack reputation for uninterrupted service and low maintenance costs.

International Motor Company
64th St. and West End Avenue, New York

We Make It Easier For You to Sell the Easiest Selling Trucks

GRAMM BERNSTEIN

TRUCKS

WE advertise *your* business in *your* own local papers over *your* name at *our expense.*

We send an expert truck salesman whenever or wherever you need him to help you close a sale—at *our expense.*

The Gramm-Bernstein line includes trucks for every prospect's needs—1, 1½, 2, 2½, 3½, 5 and 6 ton trucks. Write for all particulars of our most liberal "Help-the-Dealer" sales policy.

Gramm-Bernstein Motor Truck Co.
13 Gramm Blvd., Lima, Ohio



AUTOCARS

are equipped with the

"JASCO" TANK

Why? Because demonstrated service facts have proven that this gasoline receptacle makes fuel absolutely safe from fire or explosion and devotes every drop to energy.



"JASCO" TANKS are made of drawn steel. They are seamless, tinned and tested and positively cannot spring a leak even under the most severe conditions. They are money savers, life and property protectors. If your car is equipped with an old fashioned riveted tank you are courting danger. Investigate the "JASCO" today. Full details on request.

The "Jasco" Tank is used and indorsed by the following prominent manufacturers:

PLEASURE CARS

Biddle Motor Car Company, Simplex Automobile Company, Mercer Automobile Company, Lozier Motor Company, Stanley Motor Cariage Company, James Cunningham Son & Company, H. H. Franklin Mfg. Company.

TRUCKS

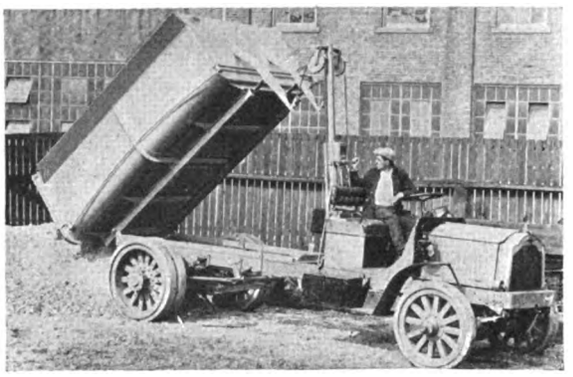
Baldwin Locomotive Works, Autocar Company, General Vehicle Company, H. G. Burford Company, Peerless Motor Car Company, Garford Motor Truck Company, Gramm Motor Truck Company, Thomas Auto Truck Company, Motor Trucks, Ltd., Canada.

JANNEY, STEINMETZ & CO.

Main Office: PHILADELPHIA

New York Office: HUDSON TERMINAL BUILDING

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"TYPE D"
Heavy Duty Hoist with Standard Coal Dump Body

By Way of Foreword

preceding an important announcement by the Wood Hydraulic Hoist & Body Company, to be made on or about January 1st, 1917, we strongly urge all parties expecting to place orders for dump body equipment within the next six months to get in touch with us by letter for advance information.

Your prompt action on this suggestion will bring you the particulars by return mail.

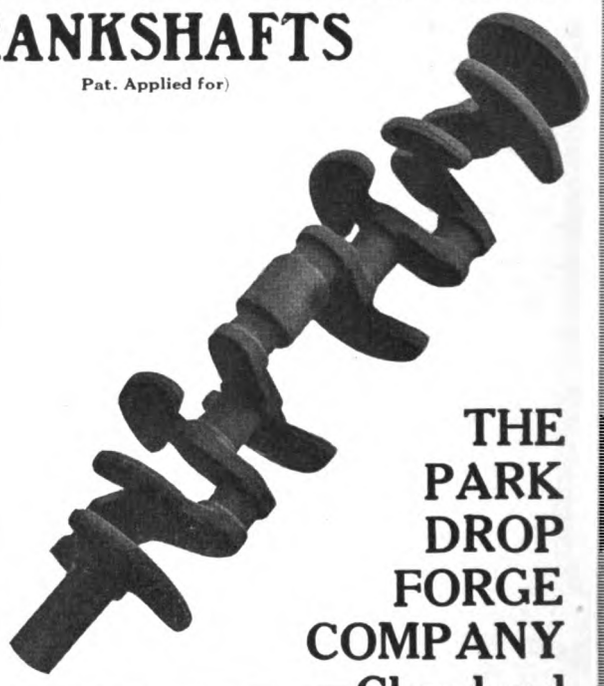
Wood Hydraulic Hoist and Body Co.
DETROIT

WOOD HOISTS
WOOD BODIES

PARK

COUNTERBALANCED CRANKSHAFTS

Pat. Applied for)



THE PARK DROP FORGE COMPANY
Cleveland



WICHITA TRUCKS

Dependability Plus Service

We want a Dealer with energy and spirit,—we want one who will make the co-operation with him of our factory organization worth our while, and his. We want men who can interest concerns in our heavy-duty trucks and then not let up until they sell them.

If you are such a Dealer we have an interesting selling proposition that will interest you immensely.

Besides the WICHITA 3½-ton capacity truck, we have a 2½-ton and a 5-ton truck—both worm driven.

Write us for our plans.

WICHITA FALLS MOTOR COMPANY
Arthur Boulevard, Wichita Falls, Texas

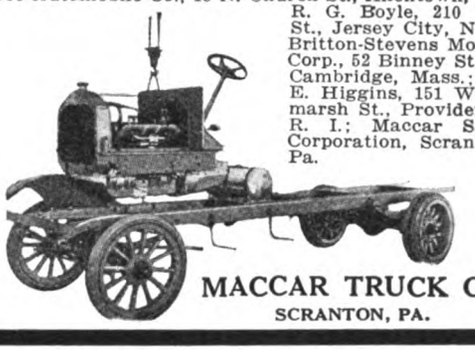
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MACCAR

Delays Cost Money

The MACCAR never stays off the road more than 30 minutes, because of power-plant trouble.
If anything happens you substitute a new power-plant—no expensive tying up of your truck for time-consuming repairs.
The motor, clutch, transmission, radiator, pump, magneto, carburetor, dash and toe boards, brake and foot pedals, steering gear and all spark and throttle controls, are assembled dust-proof, in one cradle and as a Unit mounted into the frame.
Dealers will find in the MACCAR AGENCY a new and profitable proposition. Write now for details.

Distributors:
Pitts Motor Car R & S Corp., 540 Atlantic Ave., Brooklyn, N. Y.; Maccar Sales Co., 2116 Market St., Philadelphia, Pa.; Bee Automobile Co., 15 N. Church St., Allentown, Pa.; R. G. Boyle, 210 10th St., Jersey City, N. J., Britton-Stevens Motors Corp., 52 Binney St., E. Cambridge, Mass.; W. E. Higgins, 151 Whitmarsh St., Providence, R. I.; Maccar Sales Corporation, Scranton, Pa.



MACCAR TRUCK CO.
SCRANTON, PA.

United States 'Solid Truck' Tires

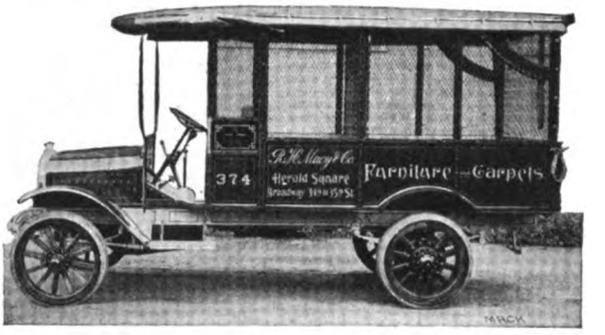
Truck Tire Efficiency

Our new, secret process compound, vulcanized under a pressure of 1,600,000 pounds (almost four times the pressure used to vulcanize ordinary truck tires) has more vitality, rugged strength and durability than any other compound manufactured.

For this reason, United States Solid Truck Tires are the strongest and most durable now on the market.

United States Tire Company
1790 Broadway, New York City

UNITED STATES RUBBER COMPANY AND ASSOCIATED COMPANIES — US RUBBER SYSTEM



Truck of R. H. Macy & Co., New York, who have more than 100 gas and electric trucks equipped with the Dreadnaught.

Macy & Co. get efficient deliveries

The hustle, bustle and confusion that you had in your deliveries last Christmas—why not eliminate them this year? Why not know to a certainty that you are getting the utmost from your trucks and drivers? Equip each truck with the

DREADNAUGHT *Indestructible* Hub Odometer
TRADE-MARK

R. H. Macy & Co. and hundreds of others are cutting out mileage waste, routing their trucks more economically—saving money and giving better service by getting accurate mileage records with the Dreadnaught. It pays them. It will pay you.



The Dreadnaught is always working — always accurate. It's easy to read because the figures do not revolve and cannot be obscured by grease or dust. It's guaranteed indestructible—a new one free if you break it.

Write now for prices and further information and learn how you can save money and give better delivery service with the Dreadnaught.

AMERICAN TAXIMETER COMPANY
Mfrs. of Jones & Popp Taximeters
1765 Broadway, New York City

SERVICE STATIONS IN THE FOLLOWING CITIES:
San Francisco New Orleans Washington Chicago Detroit Philadelphia Seattle Boston Pittsburgh St. Louis

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NEVER-LEAK
Copper Asbestos-Filled
GASKETS

Get your estimate on your next gasket requirements. You will be agreeably surprised.

For producing absolutely gas-tight joints nothing has ever been invented to compare with Never-Leak Gaskets. You can protect yourself from all worries over compression leaks if you fully equip your motor with these Copper Asbestos-Filled Gaskets.

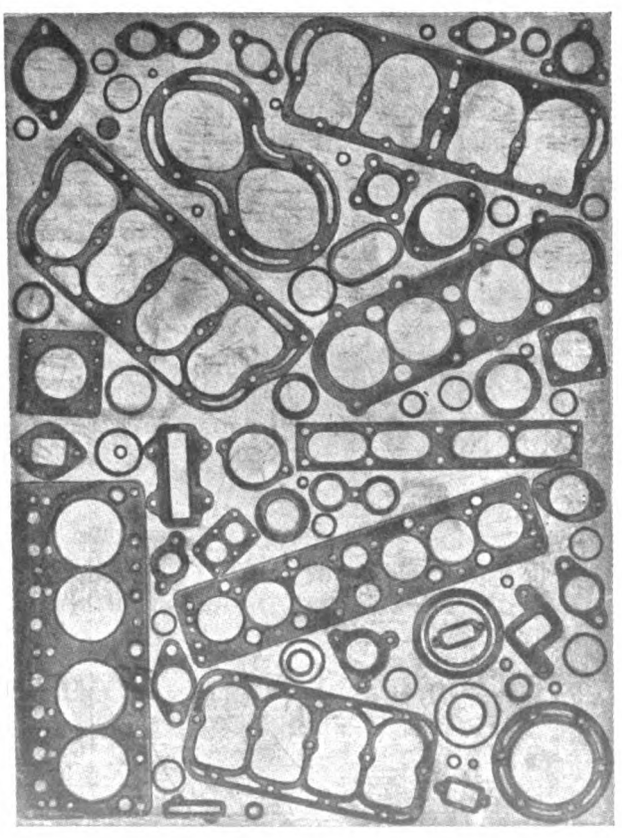
The copper gives malleable metal contact surfaces. The asbestos secures a body which retains a powerful spring under compression.

If you have gasket trouble of any nature consult our Engineering Force. This will involve you in no obligation or expense.

Write for our estimates. We are equipped with many thousand special dies such as here shown and can readily produce the gaskets you need.

Have "Never-Leak" on every gasket.

The Fitzgerald Mfg. Co.
TORRINGTON, CONN.
Gasket Dept.



The
Gary Motor Truck Company
Manufacturers of
Gary Worm Drive
MOTOR TRUCKS



5 MODELS *5 CAPACITIES*
¾ Ton 1 Ton 1½ Ton 2 Ton 3 to 3½ Ton

Complete 1917 Catalog will be mailed Promptly on Request

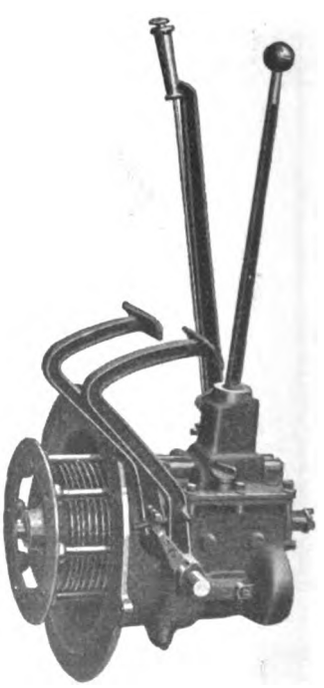
General Offices:
GARY MOTOR TRUCK COMPANY
610 BROADWAY *GARY, INDIANA*

FULLER
Unit Power
TRANSMISSIONS

Model
"T U"
¾-1 Ton

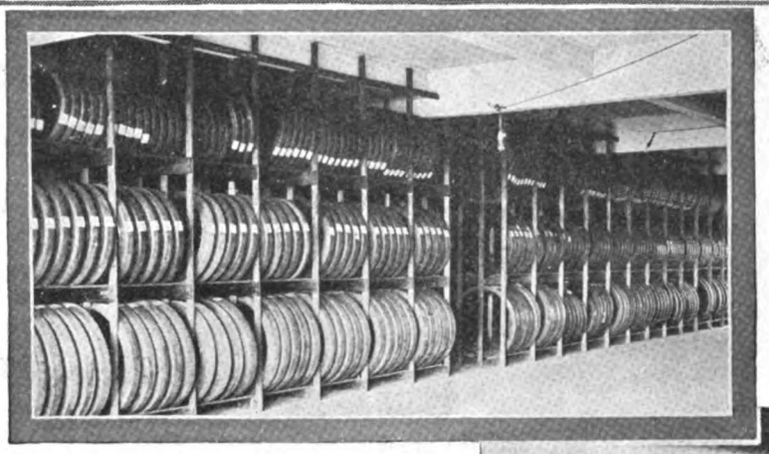
Model
"T U 2"
1½-2 Ton
4 Sizes

Particulars sent on request



FULLER & SONS MFG. CO.
Kalamazoo, Mich.

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A typical Goodrich stock room. This method of racking is gradually replacing other arrangements for keeping stocks fresh and readily accessible.

Below, a 150-ton hydraulic forcing press for applying pressed-on solid truck tires in a Goodrich service station.



GOODRICH
TRUCK TIRE
SERVICE POLICY

—The Service Division of our Truck Tire Department is the most efficient and highly specialized organization, of its kind in the United States. Its policy involves the following factors:

1. ***Ample stocks.*** Your size always on hand.
2. ***Complete shop equipment.*** Hydraulic presses, chain hoists, drill presses and other modern mechanical devices.
3. ***Intelligent workers.*** Men trained to use their heads as well as their hands.
4. ***Prompt and courteous treatment.*** Appointments by 'phone. No delays. Promises kept. Satisfied customers.

Test this policy at our nearest service station.

Service Stations and Branches in All Important Trucking Centers.

THE B. F. GOODRICH CO., Akron, Ohio

Makers of the Celebrated Goodrich Automobile Tires—*"Best in the Long Run."*

One Thousand Miles on High Gear

OVERLOADED 20 PER CENT.

Every hill on this route through Ohio and Michigan was taken on high without straining. Read the story in our booklet "The Wizard of Trucking." Only a Six and only a "Globe" could do it on 12½ miles per gallon of gas.



Six Cylinder Motor

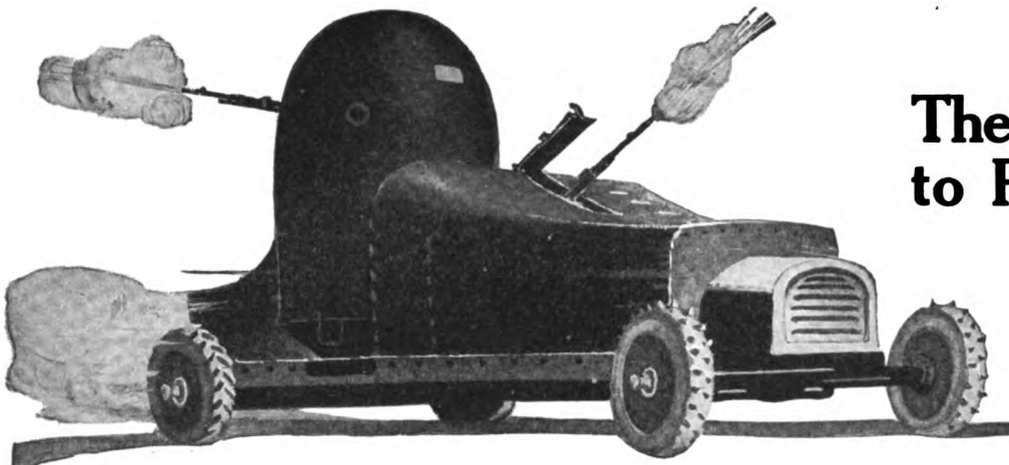
trucks handle like a pleasure car. Start easier. On high 1½ miles to 25 miles per hour. 11 to 15 miles per gallon of gas. Quieter operation. Minimum motor vibration. Go anywhere, any roads, any time. Agencies being established rapidly. Write today.

MFG. BY

THE GLOBE MOTOR TRUCK CO.

NORTHVILLE, MICH.

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The Best Way to Protect Your Motor!

To protect it from ignition troubles of any kind, install an

EISEMANN MAGNETO

You'll be sure of full power from every explosion; the intensely hot spark —*even at very low speed*—takes care of that!

You'll have ignition you can depend upon—easy starting—sure fire of any mixture, richest to leanest—that's the Eisemann Reputation.



THE EISEMANN MAGNETO CO.

Sales and General Offices, 32-33d Sts., Brooklyn, N. Y.

Detroit, Mich., 802 Woodward Ave.

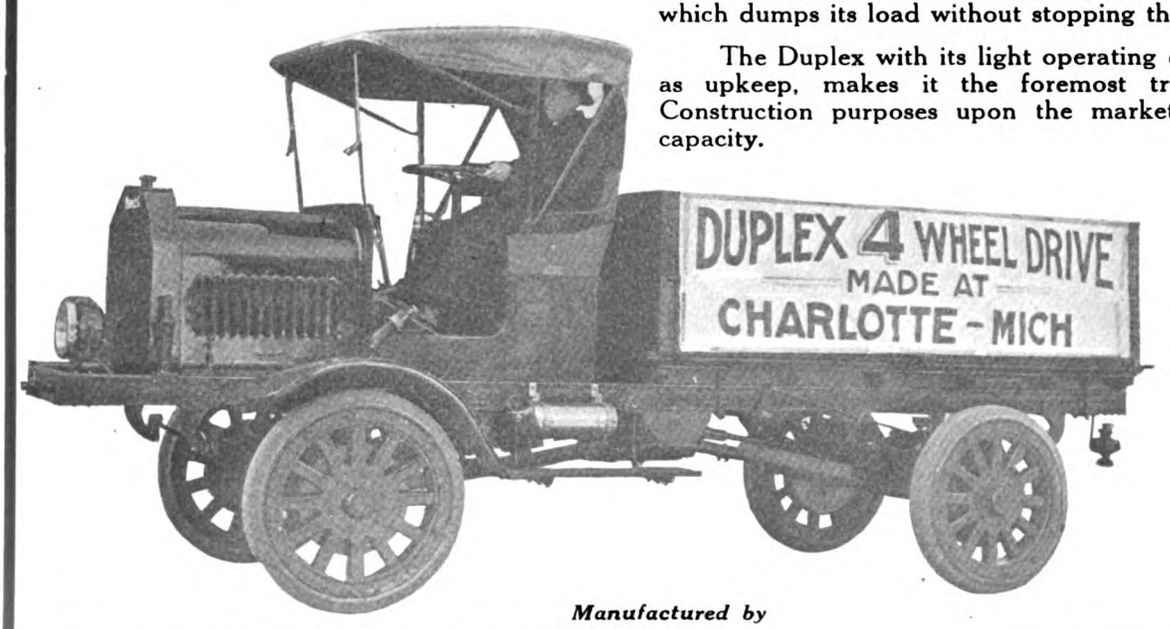
DUPLEX 4 WHEEL DRIVE

THE TRUCK OF EARNING EFFICIENCY

This cut represents the Duplex 4-Wheel Drive Road Truck, and is one of many others hauling one hundred and fourteen yards of gravel every twenty-four hours, a distance of 7.7 miles and at $1.00 per yard, earns $114.00 per day.

This truck with trailer has Duplex Side Dump Body which dumps its load without stopping the truck.

The Duplex with its light operating expense as well as upkeep, makes it the foremost truck for Road Construction purposes upon the market regardless of capacity.



Made in two-and three-ton capacity

Manufactured by

DUPLEX POWER CAR CO., Charlotte, Mich.

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Reo

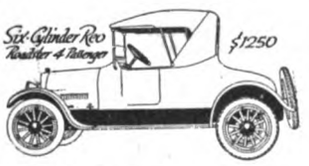
A Complete Line and —a Consistent Policy

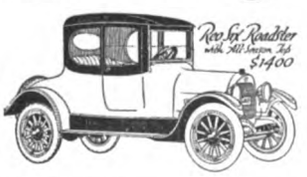














CONSIDERED FROM THE dealer's standpoint, the Reo proposition is ideal.

THE SUCCESS OF REO DEALERS is conclusive evidence of that.

THE VERY TENACITY with which distributors and dealers hang onto the Reo line shows that experience bears out what deduction would indicate.

EVERY DEALER WANTS as complete a line of pleasure cars as possible. But in most cases this can only be secured by handling several different makes of cars, each representing a different—and frequently a contradictory—policy.

YOU HAVE TO DEAL with several sets of men whose ideas of business—of engineering—of manufacturing, and of selling—differ radically.

OR, IF YOU DO get a line of pleasure cars that covers different price classes, you find yourself talking one type of motor or principle in design to one customer, another to the next—and still another to the third!

YOU ARE IN THE POSITION of a preacher who tries to expound three doctrines—but can't segregate his audiences! What he tells one, all hear.

RESULT: HE "SELLS" NONE of them—they go to another church where the man can be consistent even if not sincere, in his adherence to one brand of theology.

THEN AGAIN: Nine times out of ten, when a concern makes several models you find that one model is always pulling—another dragging.

DOES THAT SOUND FAMILIAR?—No need to elucidate further to experienced automobile merchants on that point!

AND STILL AGAIN—in those rare cases where a maker does produce several models of pleasure cars that do not conflict—still you have to go to another maker to get a line of motor trucks.

AND MOTOR TRUCKS now are considered by all live dealers, a necessary part of a complete line.

THIS REO LINE COMPRISES motor trucks as well as pleasure cars—ten models in all. And every model a known, recognized—conceded—leader in its class.

NO REO MODEL DRAGS—none has to be pulled along by a more popular one. All Reos enjoy a chronic overdemand.

THE DEALER WHO HANDLES the Reos has, in reality, three complete lines—two of pleasure cars, each made in four models; and two motor truck lines, that, working separately or in unison, perform fully 80 per cent of all trucking service.

HE CAN GO OUT AND COMPETE with the best in these several lines—and feel he has the best made in all of them.

THIS LINE IS UNIQUE in that all models—trucks and pleasure cars—are designed by the same men; made by the same men; sold by the same organization.

THE REO LINE REPRESENTS the same ideas in engineering—the same ideals in manufacturing and merchandising.

WHEN YOU TALK REO you talk the line—every word you say about one model applies to all.

EVEN THE SIX AND THE FOUR do not conflict. The one is ideal for its purpose—a seven-passenger touring car or Sedan, or for a luxurious big touring roadster—that's the Six.

THE REO FOUR APPEALS to the biggest and best class of buyers, those who want a real automobile—a big, commodious, honest-to-goodness five-passenger motor car or business roadster—at less than $1,000.

SO YOU SEE this line represents as none other does—none other, mind you—those factors every dealer desires in the line he handles.

AND ON TOP OF THAT it represents the highest ideals; the soundest policy; the best engineering, and the best quality throughout. That, every dealer knows.

WE SELDOM CHANGE, we Reo Folk. Never until we are convinced the present Reo representative never will measure up to the Reo standards. Or, as occasionally happens, to get one who will represent the full line instead of making it necessary for us to have two Reo men in the same territory.

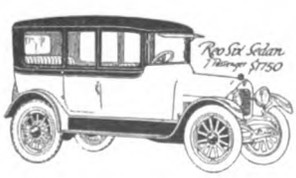
IT'S A GOOD IDEA THOUGH to get, and to keep, in touch with the Sales Department. Things may be developing that you don't see on the surface, right in your own bailiwick.

AND YOU MIGHT SECURE the plum—the best paying, because the Best line of automobiles and motor trucks made by one concern—backed by the same guarantee.

Reo Motor Car Company

Lansing, Michigan

174-A



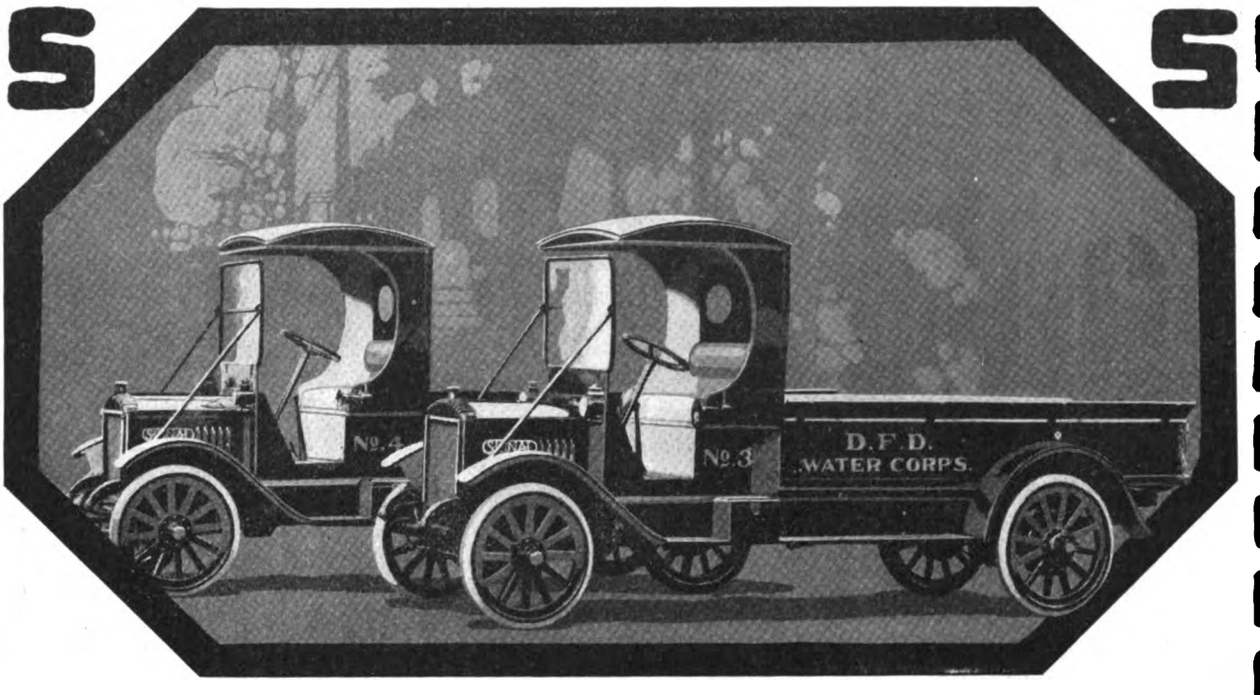




"THE GOLD STANDARD OF VALUES"

All Prices are f.o.b. Lansing, Michigan

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TWO SIGNAL TRUCKS "ON THE JOB" FOR DETROIT FIRE DEPT.

"On the Job"—Always

It's the persistency in doing a good thing that counts.

A truck that is on the job one day and not fit for work the next day is a liability. It had better be dispensed with.

You sum up all the desirable virtues of a truck when you utter these four words, "It's on the job."

There is no better quality for the truck *owner*, for it means that his truck is paying its way, not eating its head off.

There is no better quality for the man who wants the load, for it means he will get the merchandise on time.

There can be no better quality from the standpoint of the truck *salesman* and truck *dealer*, for it means freedom from persistent, embarrassing and costly service calls.

The phrase "On the Job" was fixed to the Signal by the owners of Signal trucks, who, when asked about them, uniformly replied that they were "On the Job."

Such desirable quality is a direct result of high grade construction, specifically designed to accomplish the result expressed. There are no better units than Continental Motors, Timken-Detroit Axles, Brown-Lipe transmissions, etc. If there were Signal would use them.

SIGNAL
MOTOR TRUCK COMPANY
DETROIT, MICH.

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① Strength ② Simplicity ③ Speed

STRENGTH without excessive weight
SIMPLICITY without cheap construction
SPEED without sacrificing Strength or Simplicity

BESSEMER TRUCKS

The requirements of truck users and the interests of truck dealers have been perfectly combined in

A Master Product

which serves each to their mutual advantage.

The Bessemer models represent the highest standard of truck construction.

In design, material and workmanship we have put years of experience and the result is a motor vehicle that under expert examination proves incomparably better than trucks with which it is tested.

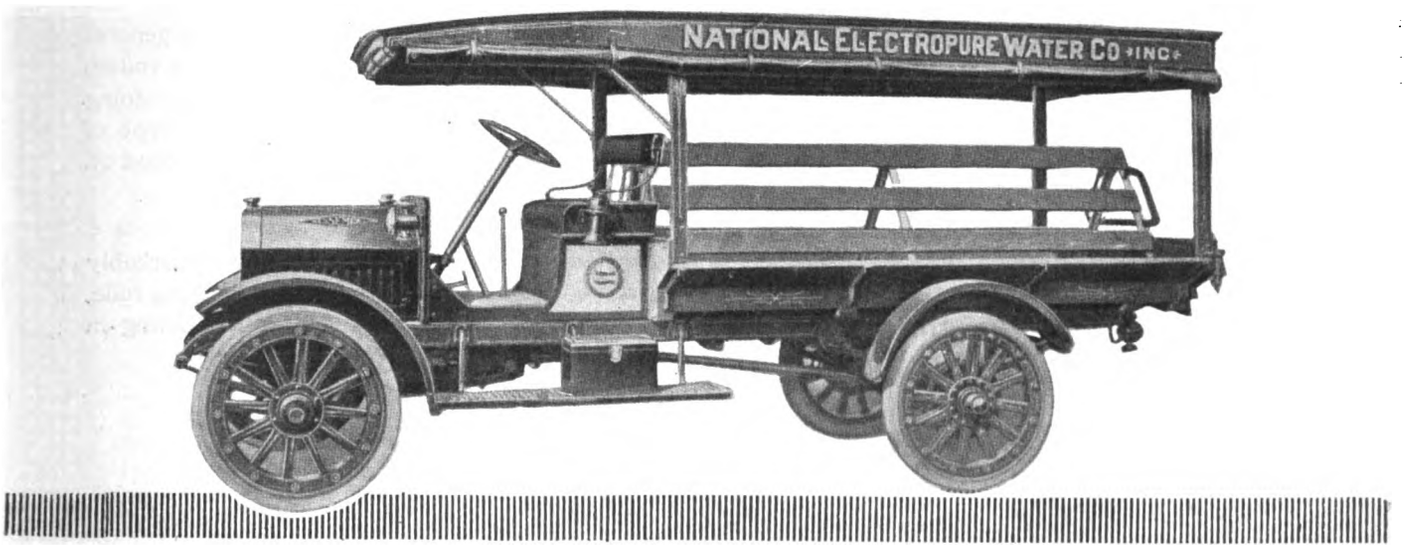
We solicit inquiries from the trade and from those who already use trucks or contemplate using them.

One-Ton Internal Gear Shaft Drive	Two-Ton Worm Drive	Three-and-One-Half-Ton Worm Drive
$1095	$2200	$3100

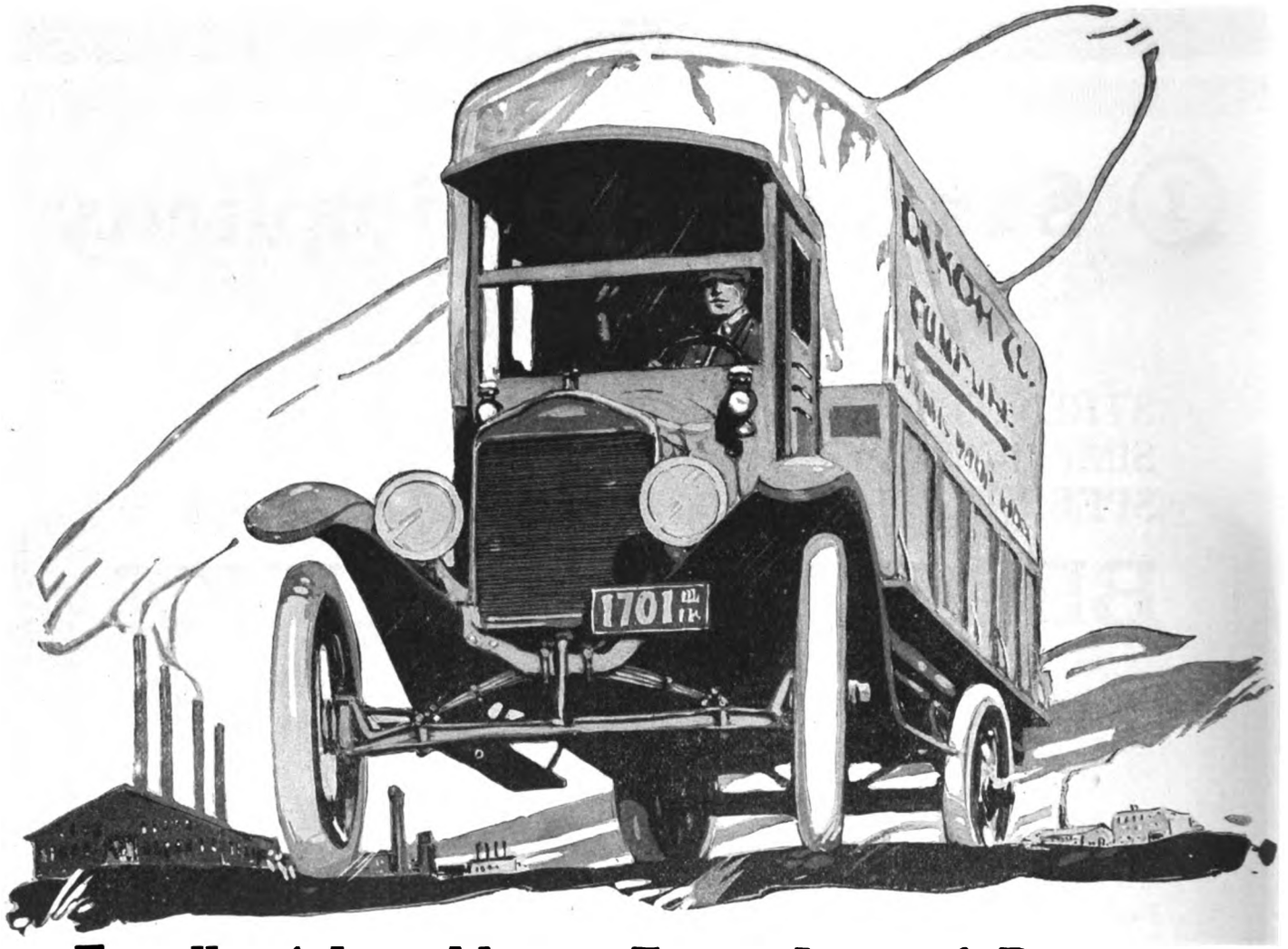
DEALERS—Write us NOW for our liberal selling plans. We give interested factory co-operation and enterprising aid to our dealers.

All Other Inquiries to

Bessemer Motor Truck Company **Grove City, Pa.**



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Equally Adaptable to Every Line of Business

Smith Form-a-Truck

$350

F. O. B. Chicago

Smith Form-a-Truck dealers are uniformly the most successful dealers in motor trucks in their territories.

Smith Form-a-Trucks are in use in practically every line of industry in all parts of the country.

They are in use hauling soil from excavations—delivering furniture — carrying mail — doing general hauling on the farm—covering the delivery routes of laundries—groceries—department stores—doing livery work as busses. Practically every type of body ever used on a motor truck is being used on Smith Form-a-Trucks.

In every service it is maintaining the remarkably low average hauling cost of less than 7c a ton mile, exclusive of driver's wages, and is duplicating in service the most expensive trucks built.

Smith Form-a-Truck Co.

Executive Offices and Salesrooms, Suite 911 Smith Form-a-Truck Bldg.

1470 South Michigan Avenue, Chicago, Illinois

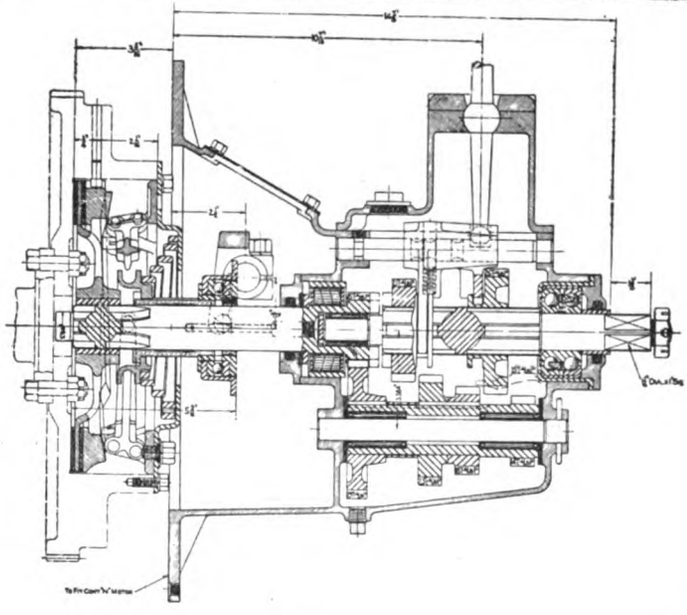
Eastern Branch
1834 Broadway, New York

Pacific Coast Branch
Pico and Hill Streets. Los Angeles

Southern Branch
120 Marietta Street, Atlanta

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COVERT



The Covert Transmission—

The car-part the dealer can mention with pride

The Covert company makes transmissions only—

But they are transmissions which have become so universally recognized as of the country's best that Covert production has been doubled, then trebled.

Made in a complete line of types and sizes—used by both commercial and pleasure car manufacturers, the Covert line meets every requirement.

Our Engineering Department will give prompt attention to your transmission problems.

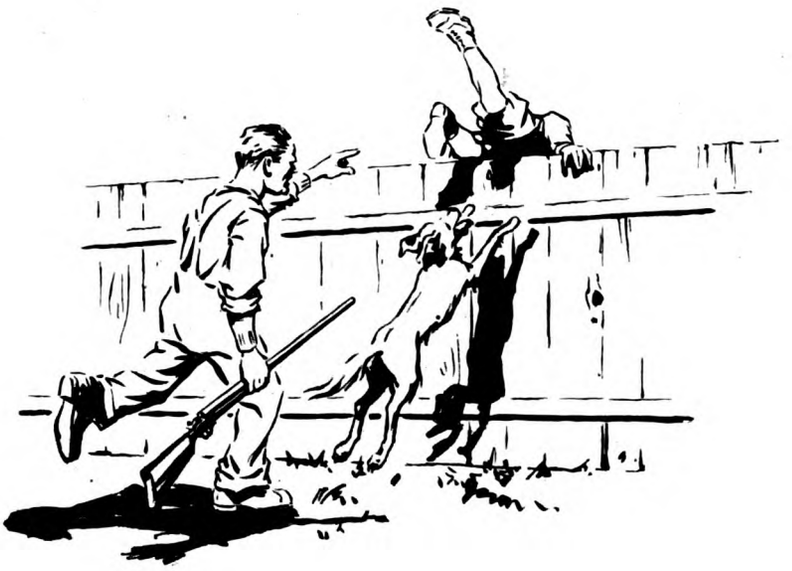
Write us.

The Covert Gear Co., Inc.

Sales Office
Detroit, Michigan

Factory
Lockport, N. Y.

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Your Side of the Fence

THAT'S the side we're on, Dealers! And we know what that means, too. For we've been dealers ourselves in the past and understand thoroughly the problems you have to meet.

Our proposition is different from the propositions you have had offered to you heretofore. It's a new one—a LIBERAL one **from your side of it** a **real money-making proposition** for YOU in every sense of the word. It will pay you to investigate our Co-operative Sales Plan.

Back of our liberal dealer proposition stand

SELDEN TRUCKS

ever ready to perform their task without calling upon you continually for assistance. Think what it means to you in increased profits to sell trucks into which future "service" has been built at the factory. Think of the satisfied customers Selden Trucks would make for you—the reputation they would build for you—the money they would put into your pockets.

Don't delay! Write us at once for full information on our Co-operative Sales Plan.

Selden Truck Sales Co.

Rochester, N. Y., U. S. A.

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Dependability



Increased by the Basic F W D Principles of Construction

"DEPENDABILITY" is a very elastic word. It has a different *degree* of meaning in every truck.

The F-W-D Truck gives to this word a broader meaning than is ordinarily understood by truck users.

Some of the reasons for this unusual dependability are deep down in the mechanism and quality of materials and are technical.

But some of the reasons are obvious and can be described—for example:

The principle of power delivered to all four wheels as applied in the F-W-D Truck distributes the power, the traction, the weight and strain—instead of concentrating the burden on the rear axle. Four points of road contact instead of two. Strain at any one point cut in half. This removes unequal strains—one of the greatest causes of wear and breakage.

The loading weight in F-W-D Trucks falls 55 per cent on the rear axle and 45 per cent on the front axle. Even loading means longer life and greater efficiency.

Traction in four wheels means less waste of power—longer life to tires.

DEALERS find the F-W-D so full of sales points that it is not difficult to sell every business man who buys a truck as an investment that will pay dividends year after year in actual money saved and transportation facilitated.

The F-W-D will out-demonstrate anything on four wheels. Responsible dealers will be added in open territories. Write for full particulars.

FOUR WHEEL DRIVE AUTO CO., Dept. K, CLINTONVILLE, WISCONSIN

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62%

of all FEDERAL SALES are Repeat Orders

ANOTHER FEDERAL!

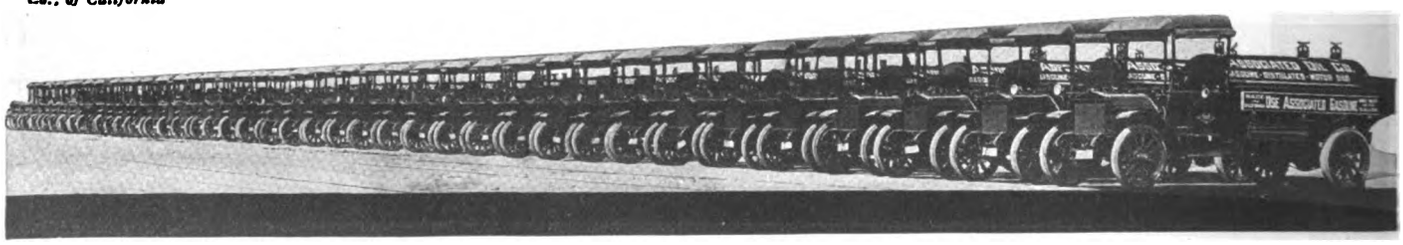
That is the best proof of Federal Quality. Trucks, like men, receive recognition for faithful service performed.

Federal Trucks are paid the highest tribute possible by their owners when they say—"Another Federal."

It will pay you to FEDERALIZE.

Here is a Representative FEDERAL fleet—Owned by the Associated Oil Co., of California

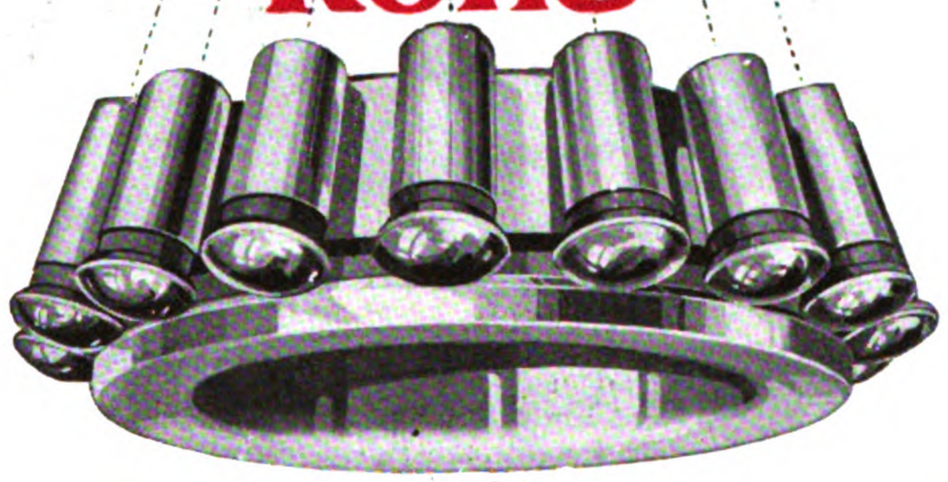
THE FEDERAL MOTOR TRUCK CO.
DETROIT, MICHIGAN



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BOCK

Everything Rolls



Here is the only Roller Bearing which carries a *two*-way load, *both* on frictionless rolling contact.

The *end* of each roller is spherical and *rolls* in unison with the tapered rollers.

It combines the good features of the ball bearing with the greater load capacity of the roller bearing.

Naturally it will carry much heavier loads and outwear any other roller bearing.

It has the universal preference of engineers and is replacing all other types used in motor cars as fast as we are able to supply sufficient quantities.

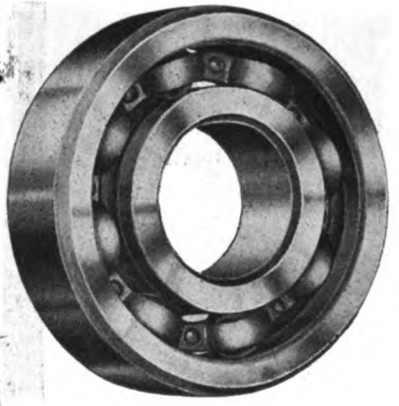
The BOCK BEARING Co.

Toledo, Ohio



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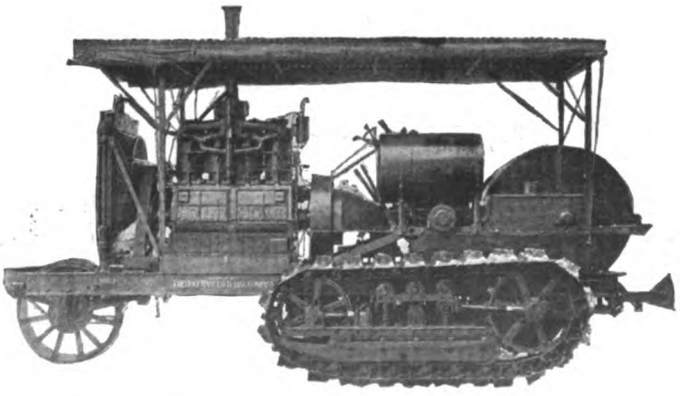
Where unusually severe bearing demands are encountered ball bearings usually are relied upon.

This is true in the motor car industry—in the machinery industry—and now in the newly developed tractor industry.

Following the lead of quality motor car manufacturers both here and abroad—as well as the lead of racing car builders, practically every one of which uses ball bearings exclusively—leading tractor manufacturers are depending upon ball bearings to perform the unusually severe work demanded in tractor service.

Illustrated herewith is a Holt Tractor, which is called upon to do perhaps the most unusually severe work ever required of a vehicle of any sort. Not only must it develop great moving power, but that power must be developed with the ponderous vehicle sliding and slewing and straining over furrows and ditches and gullies and trenches absolutely impassable to any other type of vehicle.

Ordinary construction under such conditions would prove hopelessly inadequate. That's why U. S. Ball Bearings are used in this Holt Caterpillar "75"—to provide extraordinary construction—construction which insures the superlatives of capacity, longevity and dependability.

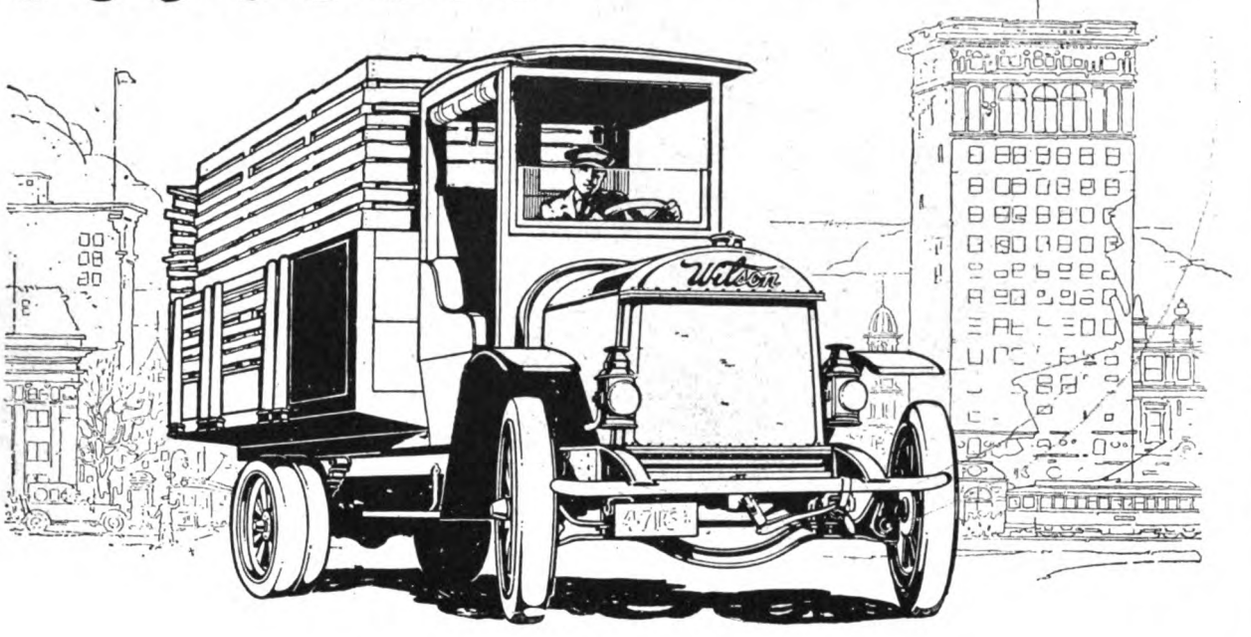


U. S. Ball Bearing Manufacturing Co.
(Conrad Patent Licensee)

Palmer St. and Kolmar Avenue, Chicago

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Wilson Motor Trucks



The Wilson Motor Truck is backed by thirteen years of engineering and manufacturing experience.

It has stood the test of actual service under conditions of unusual severity.

And it has unfailingly made good.

It is essentially a general utility truck with a minimum capacity of two tons, and a haulage capacity of four to five tons.

Its unusual sturdiness of construction, its ample powered Continental motor, its Sheldon rear axle and worm drive, all stamp it as a truck of exceptional character, while the name "Wilson" is a guarantee of the engineering ability that has been built into it.

J. C. Wilson Company, Detroit, Mich.

Good territory still open for responsible dealers. Sign and mail coupon today.

J. C. WILSON CO., DETROIT ***MAIL THIS***

Please send me your Proposition to dealers.

Name _____

Address _____

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Conclusive Evidence of Commerce Superiority—

"Less Gasoline Than a Touring Car.
"Tires Scarcely Worn After Six Months' Hard Work."

A. M. Tilden
Winter Haven, Fla.

1500 Pounds Complete Choice of 3 Bodies **$975**

To get the full import of just what service this COMMERCE Truck has performed, let us give you the gist of Mr. Tilden's letter, written as Manager of the Coahuila Fruit Company, Winter Haven, Florida.

> "For the past six months we have been using your truck on our orange grove which is planted on one of the sand hills of central Florida, and softer and looser sand than ours is not to be found. We are much pleased with the truck and I am taking pleasure in reciting to you its performances.
>
> "The ordinary touring car simply cannot move in a grove and yet we take the truck in, load it with a full load of fruit and easily haul it out, doubling the trips of a team. It has *saved us from buying a driving horse and extra team of mules, which is a considerable saving.*
>
> "In our sand road running, which is hard pulling, I find by actual test that it uses less gasoline than a touring car and in its six months' hard work it seems to have scarcely worn at all its original tires, and the extra-sized radiator has not yet allowed its water to boil.
>
> "The truck is a dandy and we are well satisfied with our bargain."

Here, again, is concrete evidence, first, of the capacity and efficiency of COMMERCE trucks, and, second, added emphasis of our statements that there isn't an easier selling line of trucks than the COMMERCE—and that COMMERCE trucks once sold stay sold.

We offer about 100 more dealers one of the very finest truck propositions that has ever been offered. In addition, our dealers' discounts are big, our dealers' contract is simple, our co-operative plans are generous, and—

We have put into operation a plan which provides for financing deferred payment sales, without the payment on the part of the dealer of any commission or brokerage fees, and

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Commerce

One Ton Completely equipped with Starting and Lighting System, Windshield, Stewart Vacuum System, Bumper, Pierce Governor and Open Express Body—Internal Gear Drive. **$1175**

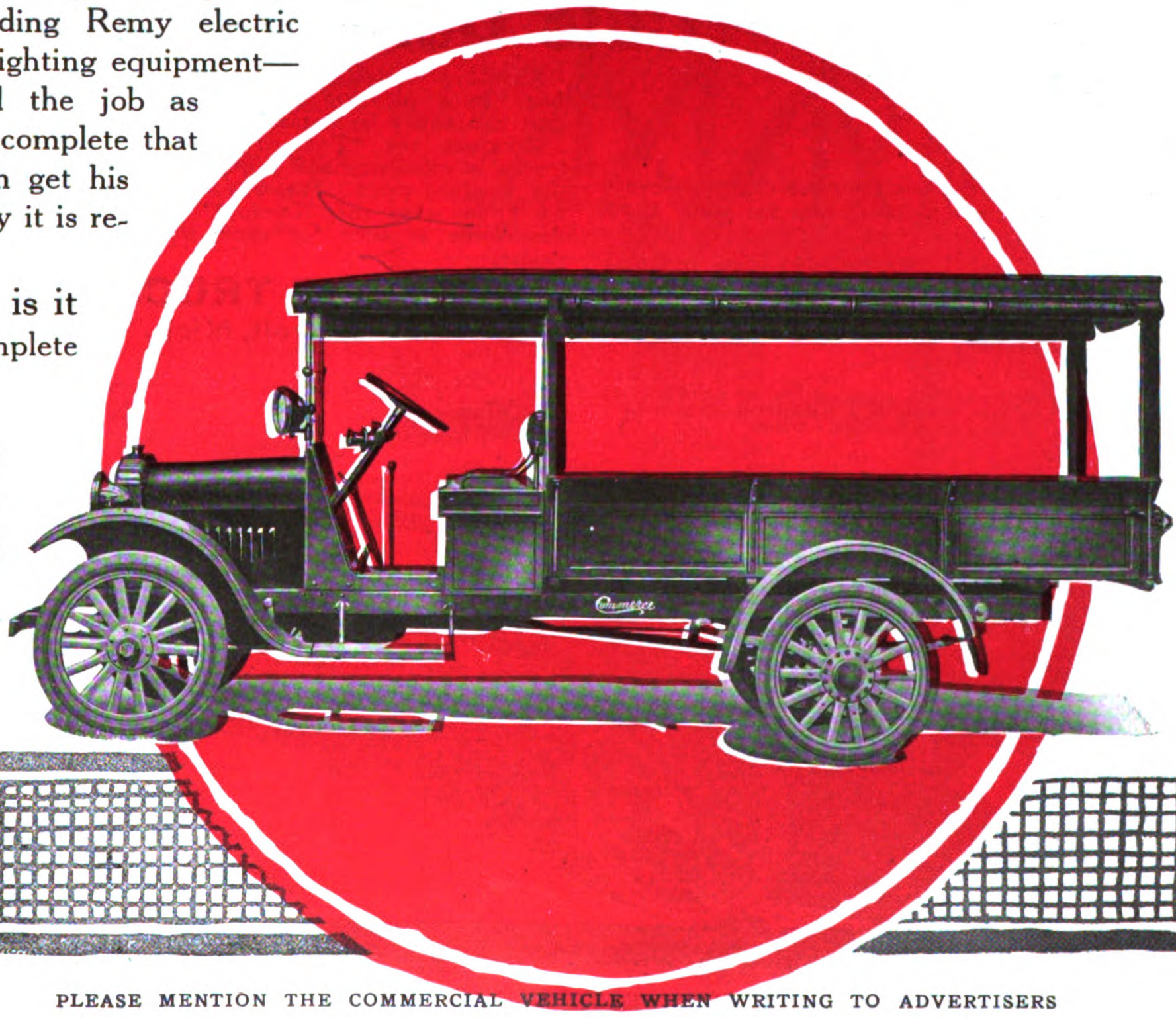
which enables the dealer to carry a large stock of trucks if he so desires.

With the addition of the thoroughly proved one-ton line, the Commerce agency becomes even more attractive.

This one-ton COMMERCE truck is the most complete job ever offered the buying public. Everything that anybody could ask for —even including Remy electric starting and lighting equipment—is there, and the job as shipped is so complete that the dealer can get his money the day it is received.

Not only is it absolutely complete in every detail, but its parts are the highest quality obtainable.

We are, obviously, extremely particular about the agencies we establish, and for that reason we are looking for high-grade dealers. If you can qualify, and think you can make money out of a proposition as attractive as the COMMERCE, get in touch with us immediately.



Commerce Motor Car Company
DETROIT, MICHIGAN

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Your Neighborhood Business can be made city-wide with

Tonford

TRADE MARK

If a one-ton truck will do, a "Tonford" will do better.

—Trade Slogan

$325

F.O.B. DETROIT

MADE IN DETROIT USA

The "Tonford" truck unit, simply and quickly attached to **any** Ford chassis, old or new, gives you a one-ton capacity truck of proven reliability.

It will cut down delivery costs and increase your business.

Inadequate delivery service restricts your trade field. A "Tonford" will make the whole city your "neighbors." You can deliver anywhere quickly and carry a load far beyond the capacity of any truck or delivery car.

Cuts Delivery Cost

It is reducing delivery costs for merchants in every line of business—it will reduce them for you. Make us prove it.

The "Tonford" has Ford strength, Ford economy of operation and upkeep and Ford simplicity.

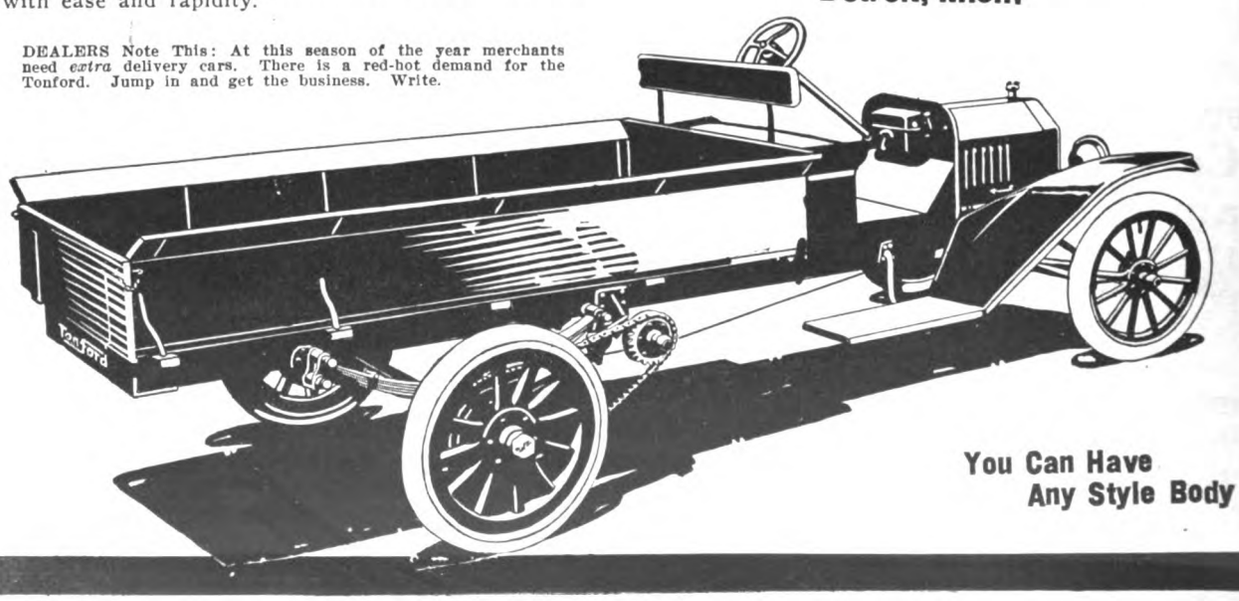
It handles easily—and carries the load up any hill with ease and rapidity.

Should you desire at any time to turn the car back to a pleasure vehicle, the "Tonford" truck unit can easily be detached.

Compare the "Tonford" with the best one-ton trucks in efficiency and economy, and then think of the Tonford price. We will risk your decision, for we know what the "Tonford" is, and what it will do. Write at once for name of nearest "Tonford" dealer.

DETROIT TRUCK CO.
Detroit, Mich.

DEALERS Note This: At this season of the year merchants need *extra* delivery cars. There is a red-hot demand for the Tonford. Jump in and get the business. Write.



You Can Have Any Style Body

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Haul It in a Hall

For Safety and Saving

There is nothing fine-drawn or delicate about the HALL TRUCK.

Here is a picture of one carrying four tons of steel. The rated capacity of this particular truck is three and a half tons, but just the same you can hop in, put your foot on the gas and drive this load away with absolute ease and safety.

And you can speed up, turn corners, plough through mud or sand, roll over rough roads—absolute ease and safety just the same!

That is the big point about the Hall—its in-built over-strength—its ability to rise to an occasion, to fill in an emergency, when time, money and business faith are at stake.

Big, burly, strong and speedy above all prospective needs, the Hall is an extraordinary time-saver, a cost-reducer, and the perfect embodiment of dependability.

In addition to its other merits the HALL is equipped with an IMPROVED WOOD HYDRAULIC HOIST, the fastest, most efficient and economical dumping device known, and a great cost cutter.

DEALERS: In addition to other sales helps and backing, we have arranged to finance your customers who desire to purchase on the deferred payment plan. Every HALL dealer is well taken care of and making friends and money fast. Better get in on this prosperity!

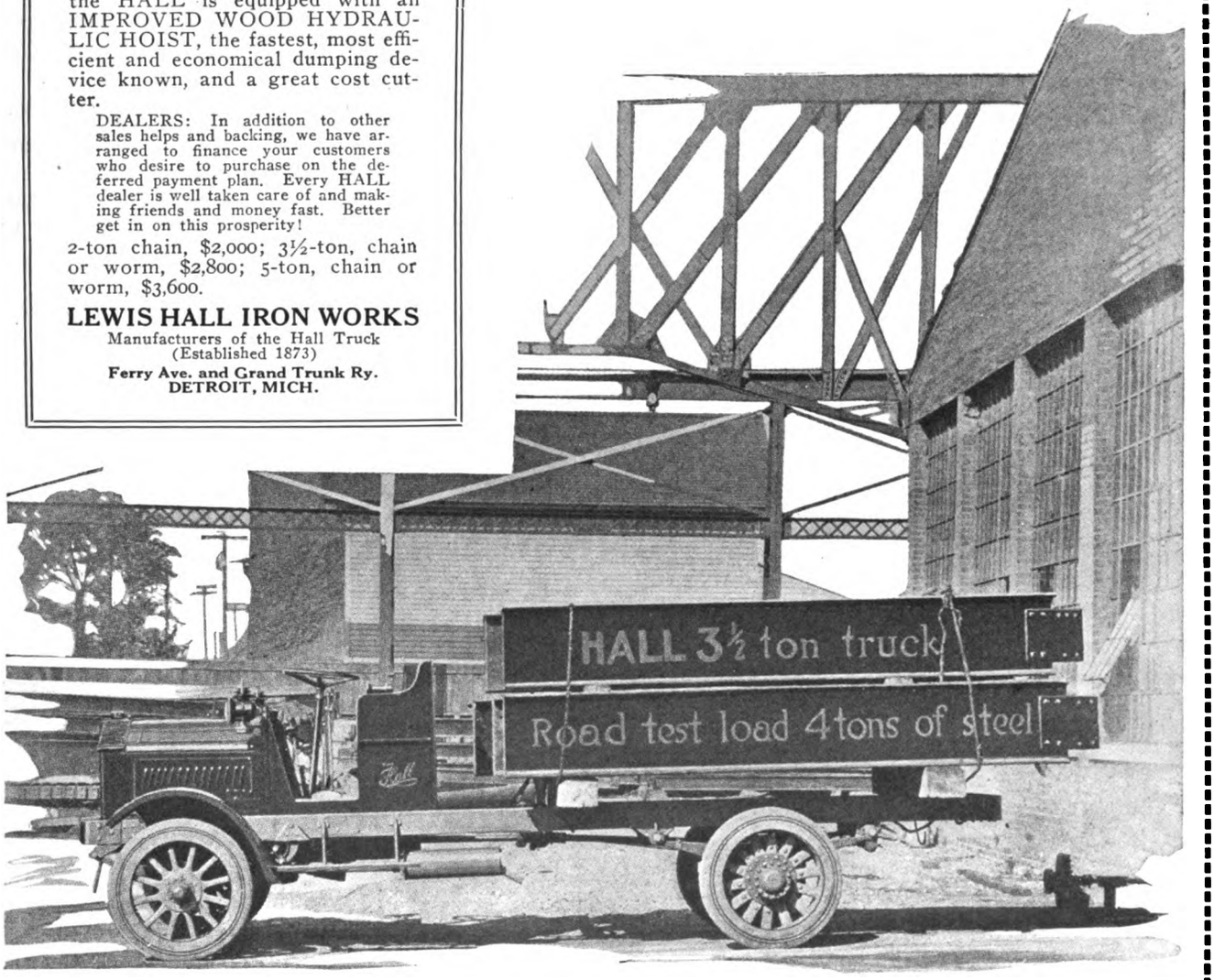
2-ton chain, $2,000; 3½-ton, chain or worm, $2,800; 5-ton, chain or worm, $3,600.

LEWIS HALL IRON WORKS

Manufacturers of the Hall Truck
(Established 1873)

Ferry Ave. and Grand Trunk Ry.
DETROIT, MICH.

THE Hall TRUCK



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THE LAST CALL FOR SUGGESTIONS! Don't let this get away from you! We want YOU to write us about this—and TODAY is the time to do it!

PALMER

What Price for These Trucks?

We are leaving it to you truck dealers, and we want every single one of you to give your opinion.

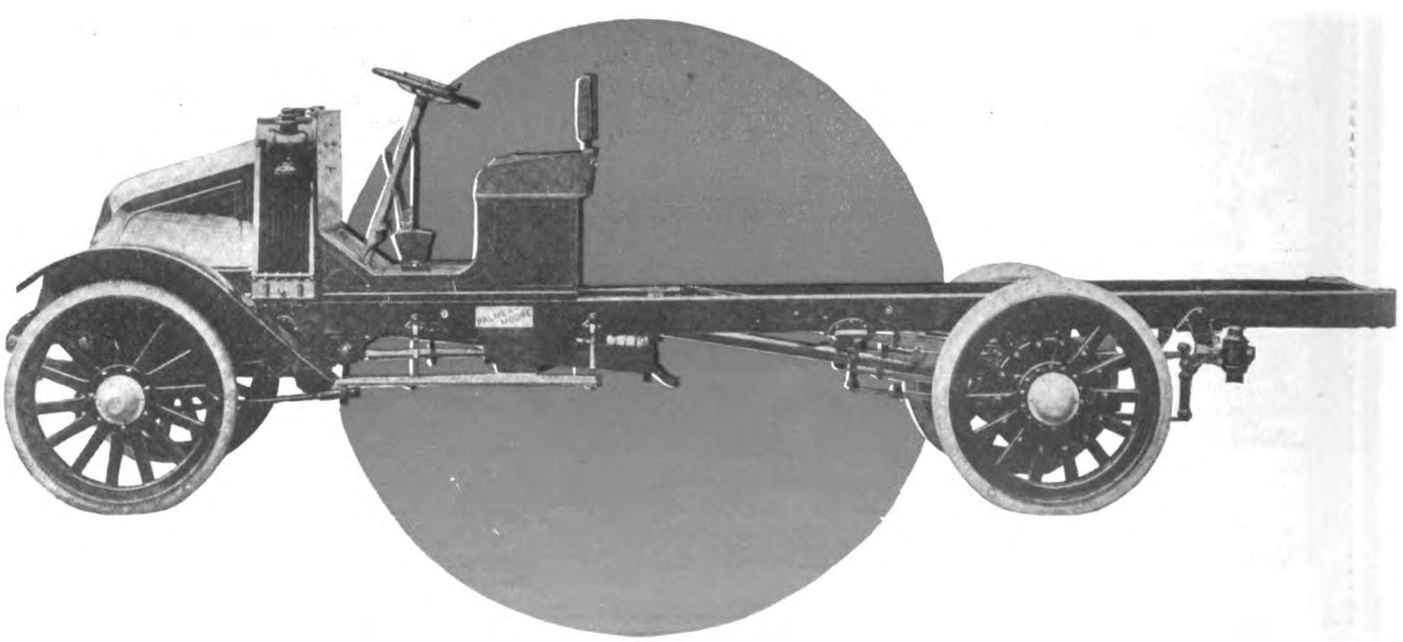
Many have already answered, some as much as six weeks ago, but we want **YOU,** WHO HAVE NOT YET RESPONDED, to do so now. We hope you will not delay doing this, for we want these prices to actually represent the consensus of opinion of **all** dealers throughout the country.

And you have a good, strong, **personal** reason for doing this promptly. There is a big, prosperous, satisfactory year ahead for those selected as PALMER-MOORE Dealers. These two trucks fill in just where demand is heaviest; they are just the size, just the weight, just the capacity to catch the biggest and strongest and most continuous demand.

Look at this picture, read the specifications carefully, and then let us know what, in your opinion, would be the best price to charge for these two models, in fairness to you, to the consumer, and to ourselves. Look up COMMERCIAL VEHICLE for Nov. 1st and 15th, and Dec. 1st.

We are leaving it to you, and

WE WILL ABIDE BY YOUR DECISION!



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THE FINEST TRUCK DEALER PROPOSITION FOR 1917 will be turned loose January 1st, and YOU want to be in on it. Get busy—NOW!

MOORE

Can You Beat These Specifications?

(SPECIFICATIONS)

MODEL M—1 TON CAPACITY

MOTOR—Buda. 3⅛" bore by 5½" stroke, 4 cylinder L Head cast enbloc. Enclosed valve mechanism. Valves interchangeable, stems hardened, 1½" working diameter, removable bushings. Three bearing crank shaft, balanced. Pistons, connecting rods and all reciprocating parts balanced. All moving parts easily accessible. Constant level oiling system, positive pump. Oil supply 7 quarts capacity. Thermo-syphon cooling. Main and connecting rod bearings, bronze shell, nickel babbitt. Cam-shaft bearings phosphor bronze. High tension magneto with special automatic spark advance. Zenith carburetor. Three-point suspension.
RADIATOR—Dash-board type. Seamless helical tubes. Top and bottom sections cast, bolted to cooling sections. **Cooling sections interchangeable.** Spring mounted.
CONTROL—Left-hand steer. Center control gear shift and emergency levers. Foot pedals for clutch and service brakes. One lever only (for throttle) on steering wheel. Spark control automatic.
DRIVE—Straight line through four universal joints (two ahead of transmission) and 2¼" tubular shaft to internal gear rear axle.
GEAR RATIO—Direct on high, 7.1 to 1. Second 10.6 to 1. Low 18.9 to 1. Reverse 26.2 to 1.
ROAD SPEED—20 miles per hour at 1400 motor R.P.M.
CLUTCH—Borg & Beck. 10" multiple disc.
TRANSMISSION—Covert. Selective type. Three forward speeds, one reverse. All gears nickel steel, ⅞" face. Hyatt roller bearings.
FRONT AXLE—Sheldon. "I" beam section, spindles 1 37/64" by 1⅝". Bower roller bearings.
REAR AXLE—Torbensen internal gear. A dead axle carries the load and takes all road shocks. The live axle and the internal gears, located in the rear wheels, transmit the power and have to stand transmission strains only. Bower roller bearings.
BRAKES—Service 15" x 2½", external contracting on rear wheels. Emergency 14⅝" x 2¼", internal expanding on rear wheels. Both have extra length equalizer bars.
FRAME—Parish and Bingham. 3/16" pressed steel, channel section, 38" wide and inswept to 33½" between front wheels. 4½" deep. 3" wide at offset, 180" long. Cross members and corners gusseted and hot riveted.
SPRINGS—Semi-elliptic. Front 38" x 2", 8 leaves. Rear 50" x 2", 8 leaves. Front hanger of rear spring designed to take driving thrust and prevent breakage of spring eye. Adjustable to relieve pressure and wear on spring bolt. Rear spring design includes a straight underslung spring to prevent rear end jumping up, also to act as auxiliary spring under excess loads. **Both front and rear springs designed with special non-slip feature.** All spring bolts have grease cups.
WHEELS—Artillery type. 14 1¾" square spokes, front and rear.
TIRES—Motor truck type. Front 34" x 3", rear 34" x 4".
STEERING GEAR—Ross, worm and nut type. 18" hand wheel.
WHEEL BASE—120". Tread 56".
FUEL TANK—Pressed steel, 16 gallons capacity.
STANDARD BODIES—Open express and stake.
LOADING SPACE—Standard; 9 feet long by 46" wide back of driver's seat. Height of floor 34" from ground.
STANDARD COLORS—Chassis, red. Body, Richelieu blue.
EQUIPMENT—Running boards, front and rear mudguards. Oil side and tail lamps. Complete set of tools in kit. Horn.

MODEL O—2 TON CAPACITY

MOTOR—Buda. 4⅛" bore by 5½" stroke. 4 cylinder L Head cast enbloc. Enclosed valve mechanism. Valves interchangeable, stems hardened, 1⅝" working diameter, removable bushings. Three bearing crank shaft, balanced. Pistons, connecting rods and all reciprocating parts balanced. All moving parts easily accessible. Constant level oiling system, positive pump. Oil supply 8 quarts capacity. Pump cooling. Main and connecting rod bearings, bronze shell, nickel babbitt. Cam-shaft bearings phosphor bronze. High tension magneto with special automatic spark advance. Zenith carburetor. Monarch governor. Three-point suspension.
RADIATOR—Dash-board type. Seamless helical tubes. Top and bottom sections cast, bolted to cooling sections. **Cooling sections interchangeable.** Spring mounted.
CONTROL—Left-hand steer. Center control gear shift and emergency levers. Foot pedals for clutch and service brakes. One lever only (for throttle) on steering wheel. Spark control automatic.
DRIVE—Straight line through four universal joints (two ahead of transmission) and 2½" tubular shaft to internal gear rear axle.
GEAR RATIO—Direct on high 8 to 1. Second 12.8 to 1. Low 26.4 to 1. Reverse 34.4 to 1.
ROAD SPEED—15 miles per hour at 1175 motor R.P.M.
CLUTCH—Borg & Beck. 12" multiple disc.
TRANSMISSION—Covert. Selective type. Three forward speeds, one reverse. All gears nickel steel, 1¼" face. Hyatt roller bearings.
FRONT AXLE—Sheldon. "I" beam section, spindles 1 31/32" by 1¾". Bower roller bearings. Steering knuckle has ball thrust bearing.
REAR AXLE—Torbensen internal gear. A dead axle carries the load and takes all road shocks. The live axle and the internal gears, located in the rear wheels, transmit the power and have to stand transmission strains only. Bower roller bearings.
BRAKES—Service 18" x 2½", external contracting on rear wheels. Emergency 17½" x 2¼", internal expanding on rear wheels. Both have extra length equalizer bars.
FRAME—Parish and Bingham. 7/32" pressed steel, channel section, 38" wide and inswept to 34¾" between front wheels. 5 9/10" deep by 3" wide at offset, 212" long. Cross members and corners gusseted and hot riveted.
SPRINGS—Semi-elliptic. Front 40" x 2½", 9 leaves. Rear 50" x 2½", 11 leaves. Front hanger of rear spring designed to take driving thrust and prevent breakage of spring eye. Adjustable to relieve pressure and wear on spring bolt. Rear spring design includes a straight underslung spring to prevent rear end jumping up, also to act as auxiliary spring under excess loads. **Both front and rear springs designed with special non-slip feature.** All spring bolts have grease cups.
WHEELS—Artillery type. 14 2" square spokes, front and rear.
TIRES—Motor truck type. Front 34" x 4", rear 34" x 6" single.
STEERING GEAR—Ross. Worm and nut type. 18" hand wheel.
WHEEL BASE—140" or 160". Tread 56".
FUEL TANK—Pressed steel, 16 gallons capacity.
LOADING SPACE—Standard length of frame back of driver's seat, 10'1" x 38". Height of frame from ground 38½".
STANDARD COLORS—Chassis, red.
EQUIPMENT—Running boards, front mudguards. Oil side and tail lamps. Complete set of tools in kit. Horn.

PALMER-MOORE COMPANY

110 N. Geddes Street Syracuse, N. Y.

PLEASE MENTION THE COMMERCIAL VEHICLE WHEN WRITING TO ADVERTISERS

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STEGEMAN 6 TRUCKS
SIX CYLINDER

7-Ton Stegeman Cost Hartje Four Cents per Mile for Fuel

Hartje & Sons Trucking Co. Say

OUR pair of Stegeman Six Cylinder 7-Ton Worm-Drive Trucks (equipped with self-starters) are averaging 50 miles per 8-hour day and are carrying 7½—8-ton loads at an unusually low cost. Have been working continuously for months (sometimes day and night) without the expenditure of a cent for repairs.

Fuel for 108 Miles Cost $4

On the Fletcher Street job, one of our Stegeman's carrying 7.2 tons made ten round trips on a 10.8 mile haul or a total mileage of 108 miles, transporting and delivering 72 tons in an 8-hour day, at a cost for fuel of only $4 or 4 cents per mile. The roads were fair.

Sizes:
1½ TON
2½ TON
3½ TON
5-TON
7-TON

Send for our Catalogue and Circular on Axle Construction

The Only 7-Ton Worm Axle Built

The rear axle is the vital unit of truck construction. We build this axle twice as strong as any solid axle made, which makes it fool-proof under abuse. Our axle is of the full floating type built in our own shop. Each axle has a double set of adjustable tapered roller bearings in each wheel.

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Stegeman Motor Car Co. Milwaukee

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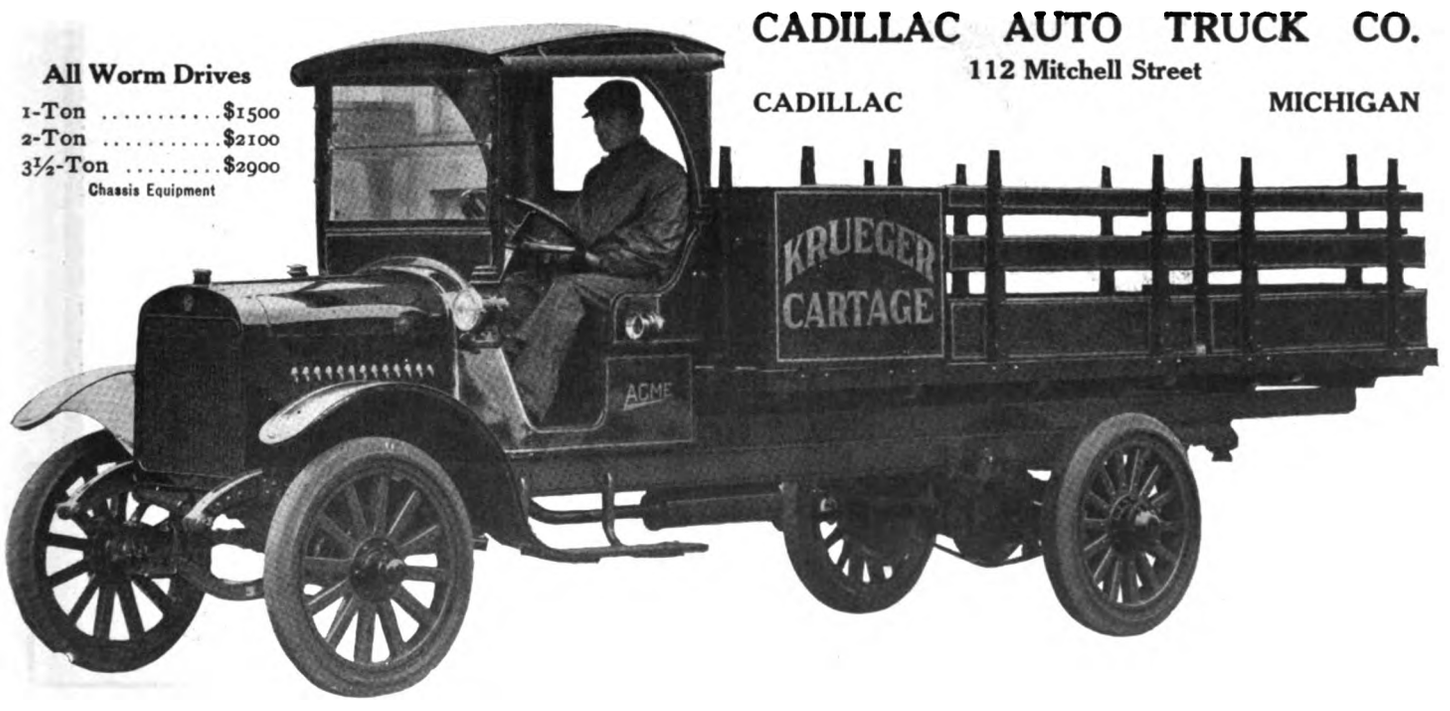
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Did You Wire for the Option on Your Territory?

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ACMES prove themselves to prospects. All models have proved units—Continental Motor, Timken Axles and bearings, etc.—are oversize in general dimensions, unusually economical on oil, gas and tires. For example, the two-ton has 40 H. P. motor—148-inch wheelbase—full floating rear axle easy clutch, 16-inch brakes, chassis 217½ inches over all.

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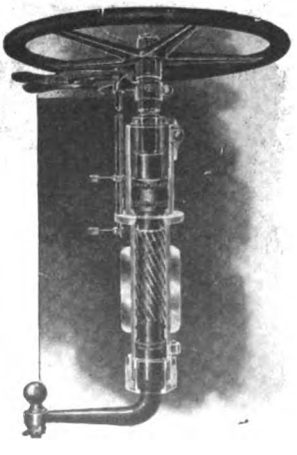
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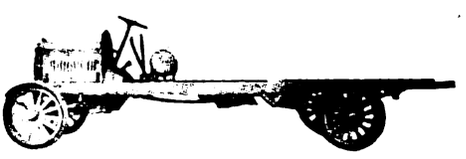
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You must be equipped to repair promptly any job damaged by fire, collision or other accident—

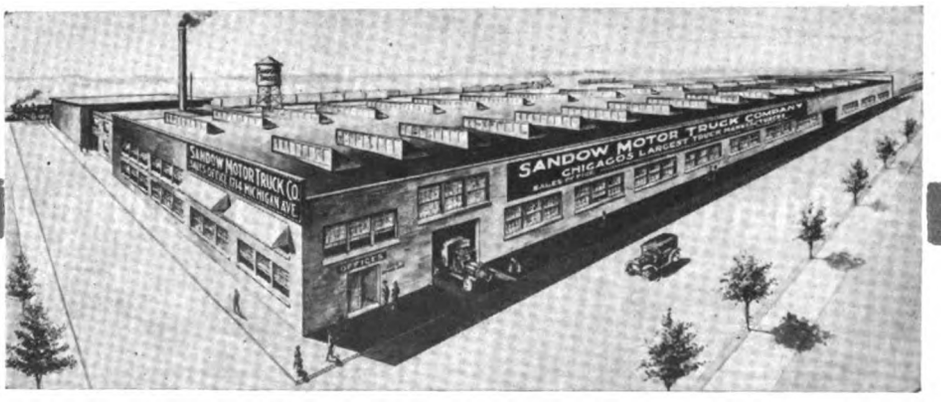
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SANDOW MOTOR TRUCK CO.

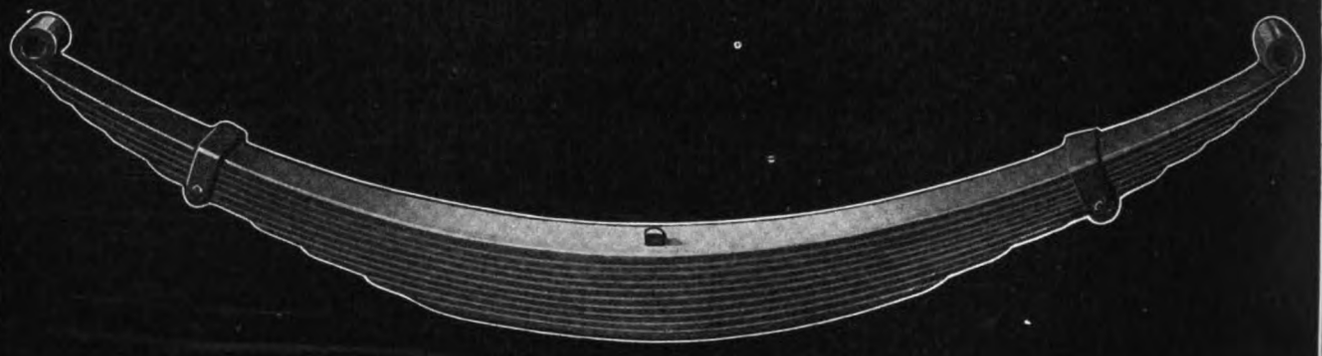
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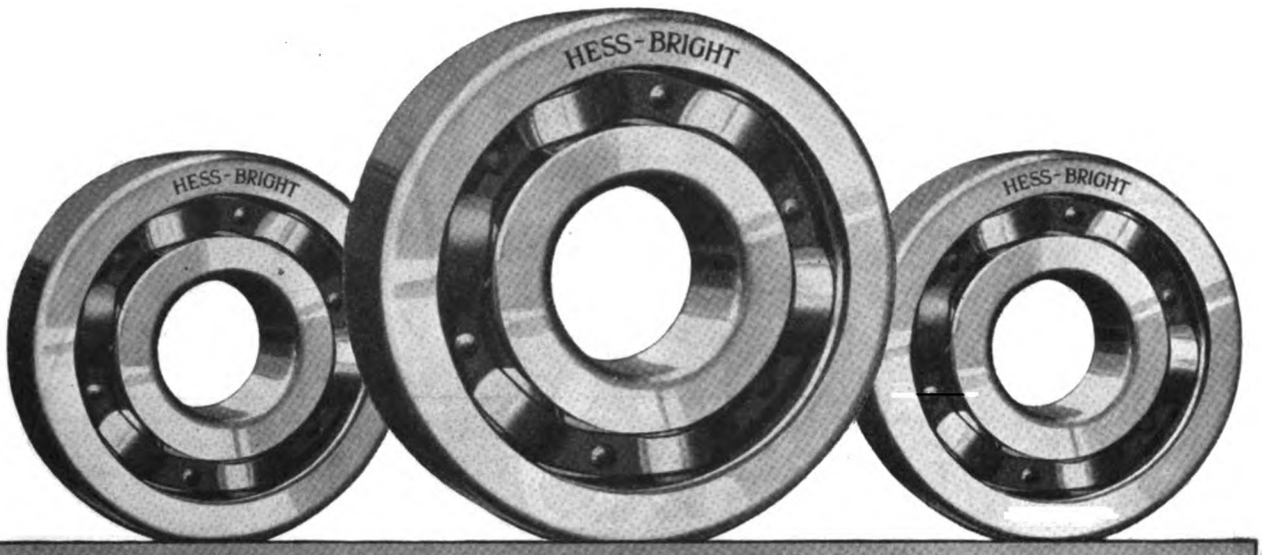
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The Mather Spring Company

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BALL BEARINGS MADE BY HESS-BRIGHT ARE BEARINGS OF CHARACTER.

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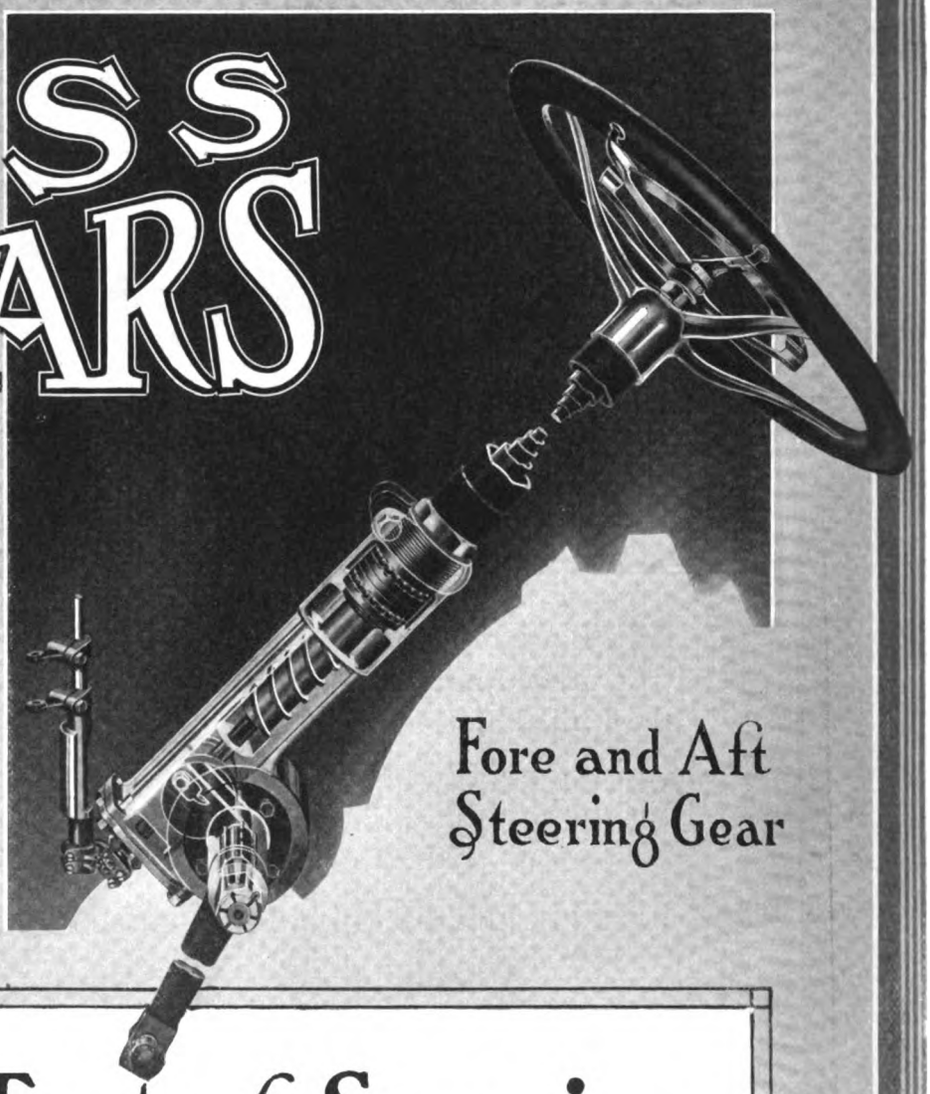
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The Test of Service

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Their perfection of design makes them wonderfully easy to operate, with the highest degree of safety and reliability, while the quality of the materials used and the excellence of workmanship insure long life and service.

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The COMMERCIAL VEHICLE
Read by Business Men

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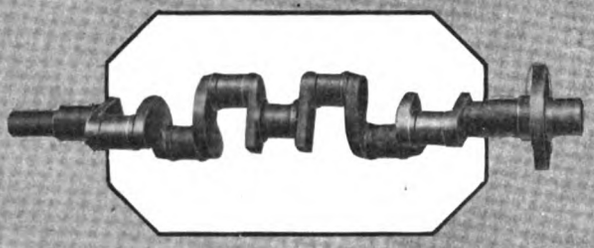
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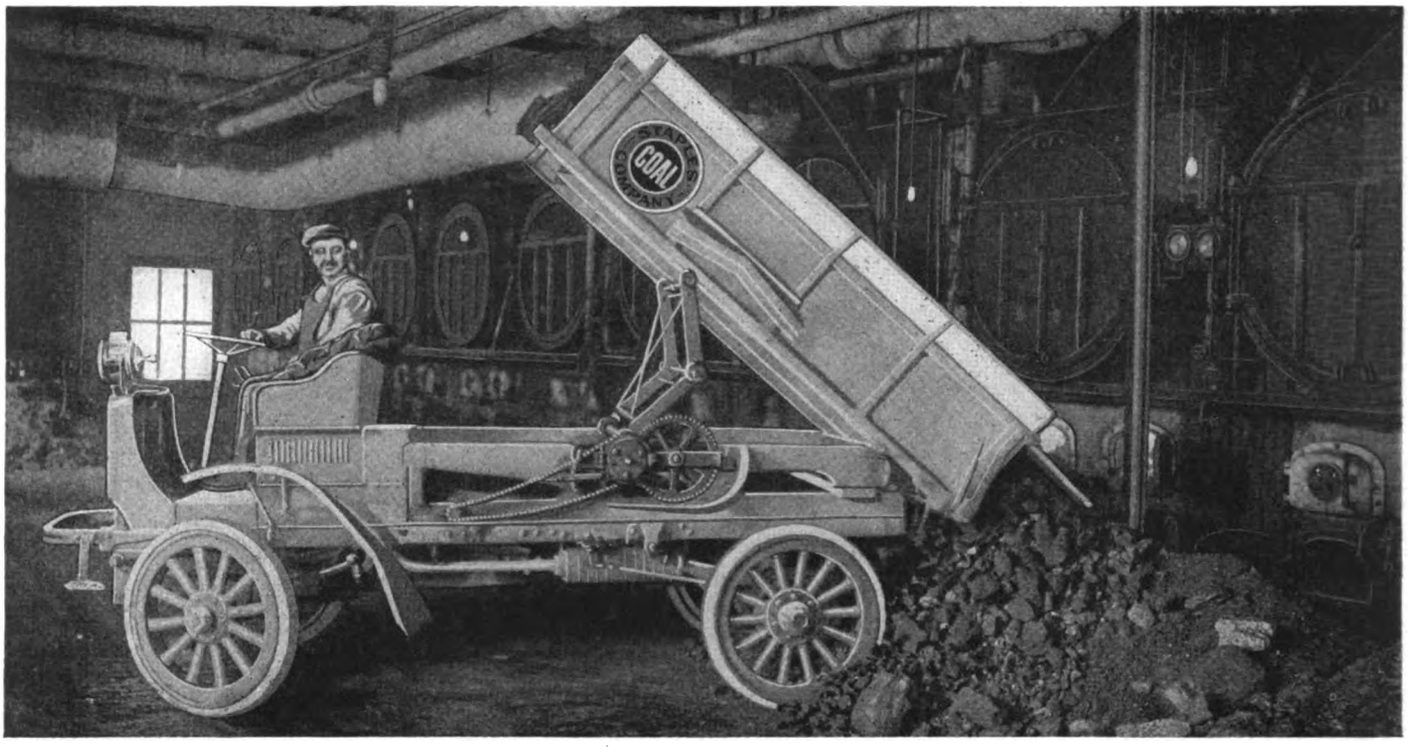
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One of the Staples Coal Company's Autocars at the plant of the National India Rubber Co., Bristol, R. I.

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The Autocar covers the widest range of delivery work--economical for light loads, yet stands up under the heavy hauling of coal dealers and contractors. Over 4000 business concerns use Autocars in quantities up to 413 each.

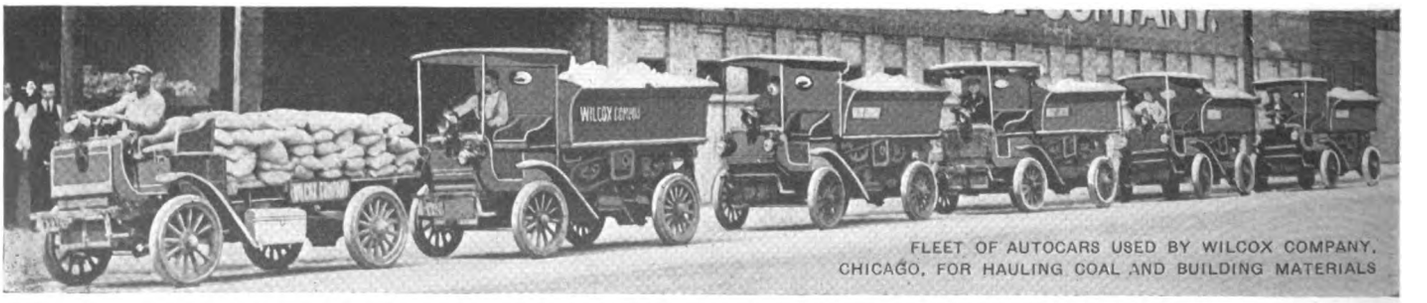
The Autocar

Chassis, $1650

THE AUTOCAR COMPANY, ARDMORE, PA.

Motor Delivery Car Specialists Established 1897

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FLEET OF AUTOCARS USED BY WILCOX COMPANY, CHICAGO, FOR HAULING COAL AND BUILDING MATERIALS

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The COMMERCIAL VEHICLE
Read by Business Men
Vol. XV January 1, 1917 No. 11

Domestic Demand Replaces War Bonanza as Truck Business Enters Era of Sounder Prosperity

Commercial Vehicle War Babies Weaned Despite Continued Large Exportation Home Demand From Individual Buyers

DOMESTIC business represents the greatest opportunity for American builders of commercial vehicles notwithstanding the acceleration of truck exports due to war demand. The increase in domestic business alone was greater than the total of exports during the calendar year of 1916, despite that 1916 was very close to the banner year in both value and volume of foreign shipments. Here are the figures:

The Year's Progress Boiled Down 1916

Total production	98,000
Exports, number	20,000
Valuation	$49,000,000
Domestic consumption	78,000
Increase in domestic sales over 1915	24,000
Trucks in domestic use	198,000
Planned production for 1917	200,000
Thirty-nine new makes.	

These facts demonstrate that the motor-truck industry has ceased to be a war bride, and that its present prosperity is based on normal domestic demand. This home call for trucks is country-wide and is not confined to any single geographical section, save that it follows the density of population logically. It is not confined to any industry. Those sections of the country that have always been the biggest truck markets, still lead. The war has created no important change in truck-consuming centers. It has had no artificial effect on domestic consumption.

New Motor Trucks on the 1917 Market

ABBOTT DOWNING
AMERICAN
BETHLEHEM
*†BOURNE
BRISCOE
BROWN
*BULKLEY-RIDER
CHAMPION
CLYDE
COLLIER
COMET
CORLISS
D-E
DENMO
DORNFIELD
ELLSWORTH
FORD
FROME
HAWKEYE
HOOVER
INTER-STATE
IOWA
KOENIG & LUHRS
KRESSLER
LANE
LAWSON
MANLY
MAXWELL
METROPOLITAN
NILES
PENNSY
PULLMAN
RAINIER
ROCCO
RUSH
STATES
THOMAS
UNION
VAN
WISCONSIN
WINTHER
**W-S
ZEITLER & LAMSON

*Tractor.
**Four-wheel-driven.
*†Gasoline-electric.

Old Makes with New Names for 1917

New name	Old name
*ATLAS	MARTIN
†COLLIER	HASCALL
RIKER	LOCOMOBILE
*ROCCO	HANNIBAL

*Product changed.
†Concern reorganized.

A Broader Market

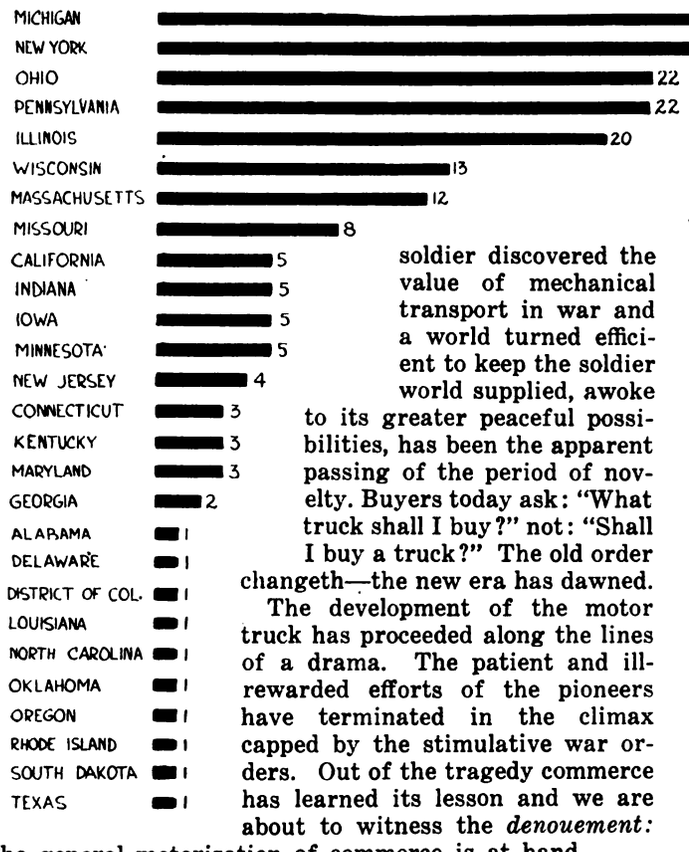
Broadening of the purchasing field has been the chief cause of the increase in domestic demand. Trucks are finding their way into smaller centers and into the hands of smaller users—small both as to size of business done and number of trucks employed. It is users of small groups of trucks rather than operators of great fleets who typify the contemporary market. The bulk of 1916 sales have been to initial buyers rather than repeat orders from fleet owners. The repeat-order demand which so characterized the lean years of 1913 and 1914 is not in evidence.

Industries are now prominent in truck buying which never before figured conspicuously, such as contracting, farming and gardening, road making, etc., while the old leaders, haulage and transfer, expressing, brewing, public service, coal and lumber supply, oil delivery, department stores and grocery wholesaling, hold their own.

The greatest change which has taken place since a world turned

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Truck Factories in Different States



soldier discovered the value of mechanical transport in war and a world turned efficient to keep the soldier world supplied, awoke to its greater peaceful possibilities, has been the apparent passing of the period of novelty. Buyers today ask: "What truck shall I buy?" not: "Shall I buy a truck?" The old order changeth—the new era has dawned.

The development of the motor truck has proceeded along the lines of a drama. The patient and ill-rewarded efforts of the pioneers have terminated in the climax capped by the stimulative war orders. Out of the tragedy commerce has learned its lesson and we are about to witness the *denouement:* The general motorization of commerce is at hand.

New manufacturers, with strong financial backing and practical plans of business are coming into the field. Conservative concerns of old standing in the passenger car field are taking up quantity commercial vehicle manufacture in genuine earnest. Factories whose passenger car business was crowded out during the war-order bonanza are leaving their truck departments in possession of this usurped space and are building additions to take care of the car business. A class of local business capital and brain is being attracted to the truck merchandising field that has never before been seen.

Truck users are buying more eagerly and sensibly than ever. Trucks are increasing in use faster than the road authorities can modernize the highways and the great by-standing public looks on with approval.

The horse jubilee draws near. People have stopped *crying* "The horse must go," they are *believing* it. Keen minds are agreed that the development of the motor truck industry is destined to continue whatever happens and it is now nearly an axiom that the commercial vehicle business will eventually exceed the passenger car industry in both number and value of product.

Predictions Foolhardy

A year ago this publication stated that manufacturers of motor trucks planned a production of 75,000 trucks in 1916. They built approximately 98,000. There were some who thought the plans of manufacturers would never materialize, yet they did in the face of grave difficulties. It appears useless to attempt to quote manufacturer's plans and *it would be foolhardy to venture a prediction of what* 1917 *production will be.*

According to extensive first-hand inquiry by letter and personal visit to every important maker it appears that more than 200,000 trucks are projected for 1917, making no allowance for new concerns now entering or yet to enter the field. In the past month three big-production low-priced chassis have appeared with should meet a great demand. Yet, before the year is out unforeseen circumstances may intervene to reduce the actual production. We may be in a war. The "horrors of peace" may overtake us. We may encounter a period of depression. Unwise legislation may cripple the industry. But by all odds the greatest probabilities are that 1917 will see the greatest increase in production, both in actual numbers and in per cent ever found in the industry. This occurred in recent years in the passenger car business. The truck industry is destined to exceed the passenger car trade and that soon. This is only possible by continued radical increases in production for the next few years to come.

Production Limitations

Supply of Material and Labor Will Be Deciding Factors

Only three uncertain factors will govern 1917 production: demand, as above analyzed, labor and material. The industry has gone through an era of strong demand and scarcity of material which a few years ago seemed an impossible condition. At that time a war involving nearly the whole of Europe was adjudged improbable by most persons. Today we have learned to admit many more possibilities than we used to.

In 1915 about 250 manufacturers built 74,000 trucks or slightly less than an average of one a day apiece. In 1916 about the same number produced 98,000 trucks, or one and a third truck apiece. For 1917 about 200 builders plan a production of 200,000 trucks, or three and a third each per day.

Great Production Capacity

Motor truck manufacturing plants are able to turn out trucks in quantities. Today a grand average of the maximum capacities of all American truck factories shows that each is able to produce twelve trucks per day. This means a capacity of 800,000 a year, without adding another building to any existing truck factory or building any new ones. Of course, in no industry is the maximum capacity of all of its plants ever used at the same time, nor is the maximum capacity of any one plant made use of all of the time. But the industry is ready with the plants and machines for any demand that may be conceived at this time.

Can materials in sufficient quantity be bought? It is impossible to speak with confidence on this topic because so much is a matter of conjecture on the future. This year the makers planned to build 75,000 trucks and built 98,000. The material for the extra 23,000 trucks, or 30 per cent—more than the total of war orders—was obtained, albeit with difficulty.

If the makers found it difficult to secure material for 98,000 trucks in 1916, how about 200,000 in 1917? There is a hopeful sign in the falling off of war orders for other manufactures of steel, aluminum, wood, brass and bronze. There are grounds for optimism in the peace negotiations.

Production would undoubtedly have been larger the past year had not it been for the restricted condition of the material market. Component parts were hard for the assemblers to get because raw materials were hard

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to get. Some of the difficulty in securing finished or partly finished parts was the labor situation.

Labor was scarce and very dear. The munitions makers, unmindful of the great harm they were doing and thoughtful only of immediate and essentially temporary gains to be derived from munitioning the belligerents, have paid practically unskilled workers wages which are in excess of the normal wages of highly skilled workers. To secure labor, therefore, in centers near munitions plants—and they are in almost every industrial section—motor vehicle manufacturers were obliged to compete with these open-handed employers with the result that in motor truck plants the country over wages have gone up from 10 to 15 per cent.

Unless it is possible to employ skilled mechanics at lower rates in the future, motor trucks will be more expensive.

What Unpreparedness Cost

More than half of the factories have experienced difficulty in securing materials. About one-seventh of them have suffered curtailment of production. Only a third of the makers were able to escape serious difficulties from this cause, half of these escaping because of forehandedness in contracting for parts and materials sufficiently in advance to avoid the sharp increases in price and delays in delivery. One maker in every three has had to increase his prices in the past year.

Some of the minor results of the material situation have been increased cost of job machine work done outside of assemblers' plants. Decrease in the quality of both material and workmanship has been noticed in some parts due to the necessity of changing sources of supply. This latter evil is fortunately not widespread. There have been notable instances of manufacturers who have undertaken to manufacture more of the components of their chassis in their own plants, as an escape from the uncertainties of an undersupply of standard parts.

One hopeful development has been the entry by a number of new concerns, or concerns in other lines, into the field of truck parts manufacture. There are scores of important new axle builders, makers of motors, radiators, magnetos, clutches and gearsets, shafts, universals, wheels and steering gears.

Fighting Rising Costs

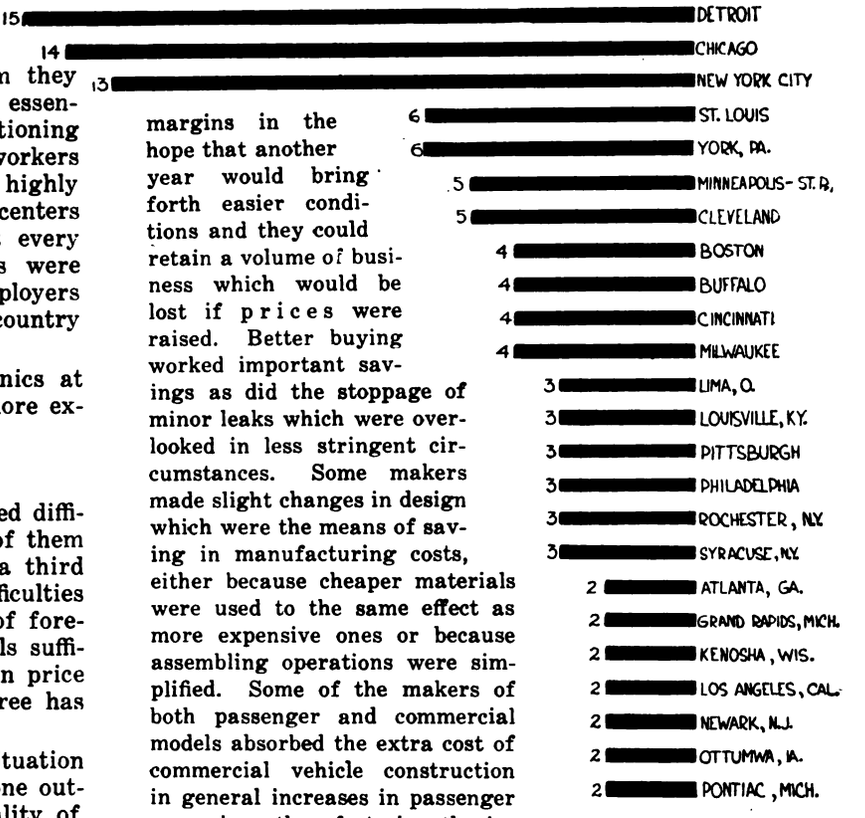
Bettered Efficiency Offsets High Materials and Wages

The evils of the material situation have been minimized to a gratifying degree by increased efficiency in manufacture. Approximately 35 per cent of the truck builders in this country have made improvements in their factory management loking to increased efficiency. As apart from this, increase in volume alone has enabled another 16 per cent to effect economies.

Why Prices Didn't Soar

Fourteen per cent—surely not a large number, and at that mostly the smaller producers—found it impossible to combat rising costs with any measure of economy. Improved labor-saving machinery served to effectively absorb the extra costs in many factories. Many factories worked on closer margins in the hope that another year would bring forth easier conditions and they could retain a volume of business which would be lost if prices were raised. Better buying worked important savings as did the stoppage of minor leaks which were overlooked in less stringent circumstances. Some makers made slight changes in design which were the means of saving in manufacturing costs, either because cheaper materials were used to the same effect as more expensive ones or because assembling operations were simplified. Some of the makers of both passenger and commercial models absorbed the extra cost of commercial vehicle construction in general increases in passenger car prices, thus fostering the infant industry at the expense of an established line to which the pro-rata tax was as nothing.

Truck Factory Distribution by Cities



Unquestionably the cost of making sales this year has been less than in previous years and we may well look for a continued decrease in sales cost due to the education of the public. Salesmen no longer have to sell as many prospective purchasers on trucks; it is now a question of which truck to buy.

Economy Through Efficiency

That these economies have been real is indicated not only by the slight increases in prices as compared with the increased production costs, but by the smaller number of men employed per unit of production.

Motor truck makers averaged a production increase of 30 per cent, while payrolls, throughout the field, only increased 21 per cent.

Although the increase in production during 1916 was only 30 per cent, whereas in the year previous it was close to 50 per cent, expansion of factories progressed much farther in the year 1916. This is because the increase in the 1915 production was made principally in the same plants that had formerly produced the smaller outputs by means of fully occupying plants that had previously been only partly used and by working double and sometimes triple shifts. An increase of over 100 per cent has been made in truck manufacturing facilities during the year past.

Two of the economic measures which have been adopted by the motor truck industry to combat increased costs which have been effective in the year just passed and which further promise permanent relief to these concerns are the purchase of materials in advance of requirements and the manufacture of small parts.

Formerly many concerns did not order their parts until sufficient sales were made, either to or through dealers, to insure prompt acceptance of a definite factory series. They consequently bought in small quantities and on short notice, so that deliveries were precarious and prices high. Then,

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too, they found it impossible to keep a fixed force of men continuously at work.

By buying on advance contracts, for requirements many months in advance, agreeing to accept a fixed allotment monthly, and by calling in many contracts for small machine jobs on special parts and doing such work in their own shops at odd times, these manufacturers have been able to effect economies such as to maintain their prices when other concerns were forced to raise theirs, in some cases, to maintain a steady rate of production proof against sudden changes in parts demand and to economize in assembling and small machining cost.

A Survey of the Market

Practically Every Line of Business Buys Every Type of Truck

One remarkable feature of the market today is that there seems to be room for every capacity of truck. There is far less marked preference for any particular capacity. The 2-tonner still leads, of course, but the 1-, 3- and 3½-tonners are on an equal plane. The ¾-tonner is equalled in popularity by the 5-tonner, both being inferior in demand to the former sizes, with the ½-tonner close behind. The less-than-½-tonner, the 2½-tonner, the 6-tonner and all the heavier sizes still occupy the minority on about equal terms. This does not include that ubiquitous and versatile vehicle which hails from Highland Park, Detroit, either in its virgin state or reinforced for more strenuous service.

Biggest 1916 Truck Buyers

To name what trades stand out prominently in truck purchases would be to practically name the roster of standard business pursuits in this country. In the order of their importance as prominent figures, at the present time, the following trades may be mentioned as worthy of particular note:

Contractors lead. This is undoubtedly due to the great activity in building resulting from accelerated industrial development of all kinds.

General Hauling and Transfer Concerns. These have always been leaders, since these are transportation trades and it is only natural to expect a specialist in transportation to appreciate the value of modern and efficient rolling stock.

Brewers. Despite the prohibition agitation, breweries still demand large supplies of trucks to haul their products to the ever-widening reaches of our industrial centers.

Public Service Corporations. This includes telephone companies, electric-lighting concerns, gas stations, etc.

Expressmen.
Farmers and gardeners.
Meat packers.
Coal dealers.
Lumbermen.
Furniture dealers.
Oil companies.
Road building contractors.
Department stores.
Metal trades.
Wholesale grocers.
Produce commission merchants.
Dairies.
Building material dealers.

Distribution as to geography of sales falls about 40 per cent in the Eastern States and 60 per cent in all other parts of the country. The Middle Atlantic States consume the greater portion of the trucks, seconded on about an equal footing by the Central, New England, Pacific Coast and Middle Western States. Very few makers remain who confine themselves to purely local distribution.

Of the individual States, New York is the big leader, followed in order by Ohio, Massachusetts, Illinois and Michigan. By cities, New York is first and Chicago second as present markets.

Improvement of roads has had a considerable effect on sales, according to the consensus of opinion of sales managers. While none seem to regard road conditions as a governing factor in the sale of trucks about 80 per cent grant that it is a highly important one. This effect has been most marked in opening up territories which previously have been very poor markets and in promoting sales in rural communities generally.

What Roads Have Done

It has long been recognized that the continued and phenomenal demand for motor trucks in California and in New England has been directly traceable to the good roads there. Then, too, a comparatively new field has been opened up in the great activity in road building, road-building contractors having found the truck a means of great acceleration of their work and of economy.

Furthermore, dealers have found that in communities where good roads abound there is usually a progressive spirit that makes the sale of commercial motor vehicles much easier.

The sale of trucks in fleets is mostly confined to a few makers who have specialized in this class of business, and even here it is being found that the individual sale to the operator of three or less trucks makes up the bulk of the business. Some are finding fleet sales unprofitable owing to the great reductions from list prices which are frequently demanded, although others still find the fleet the ideal installation and bend every energy to the formation and upbuilding of fleets.

Better Trade Practices

Sounder Business Methods Result of Improved Dealer Personnel

Unquestionably there has been an improvement in dealers in the past year. This improvement has not been uniform, however, and there are still many undesirables representing substantial, conservative concerns whose products deserve better representation. That the potency of a small group of dealers for evil is much greater than that for good is indicated in that while there has been a very gratifying improvement in the caliber of the dealer, both from a standpoint of his knowledge of transportation, his capital, facilities and business methods, still, the improvement in trade practices has not been so marked, although it would be unfair to say that there has not been much improvement.

The most outstanding features of this change in dealer personnel is the influx of substantial business men from older and established lines of business, particularly the machinery trades. These are men with capital and business standing in the community. They are able to discuss the question of efficient transportation with other business men on an equal plane. The dignity of their position renders questionable trade practice less likely because less necessary to attract and

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hold the interest of the prospective purchaser and to convince him in the end. A man will listen to the counsel of an equal where he will disregard the advice of one whom he considers less qualified than himself to judge.

The garage man, erstwhile liveryman, has no place in the truck business and he is rapidly being crowded out. The greatest number of truck dealers to-day are specialists in commercial vehicles, either handling trucks to the exclusion of passenger types, as a specialty in a general machinery line or as a sole stock in trade, or else, where passenger cars are also handled, through a separate truck department with a special sales manager and a distinct sales force.

The recent wholesale abandonment of branches by truck factories has run its course and the pendulum now swings the other way.

Less Seasonal Fluctuation

A better class of dealers has been attracted to the truck trade because the trade itself has become better. There is less of the spasmodic about it and the business is conducted on a higher business plane. Still, it cannot be said that the demand for motor trucks remains constant the year around. There are still peaks and valleys in the curve; but the attraction of better brains, more ample capital and better front, if you will, will surely result in building up the low spots and spreading the periods of congestion over more time.

It is agreed that midsummer and midwinter are the dullest times for truck dealers. The effect upon manufacturers is not so marked, especially since dealers are learning to stock trucks locally before sale. Spring is the biggest buying season, although the autumn sales are rapidly climbing the scale to an equality.

Concerning trade practices—and we usually discuss the evils, since the good features take care of themselves—price-cutting is the greatest evil. In fact, it may be called the only real evil, since it includes all other important ones, such as trading-in, free service, demonstrations, over-rating, mis-application and even the bad features of time payments.

Simple reduction of selling price below the list or advertised price has now become an infrequent practice among the best dealers. More than a third find that it is not serious enough to worry about and an additional 25 per cent have noticed a great improvement in this respect among competitors. The rest are still battling with the evil.

The Trading Evil

But though the bald proposition of cutting prices is not heard so much as it used to be, the same thing in effect is offered in the form of ridiculous allowances for old vehicles traded in as part payment. Most of the old trucks which are disposed of by buyers are trucks which are either reduced to the status of junk, of obsolete models and therefore, unsalable at anything near their actual value, trucks which should never have been bought in the first place, due to poor quality or design or unsuitability to the work required—the latter are usually in poor mechanical condition—or vehicles which have been subjected to excessive abuse and have been incapacitated for profitable use thereby.

It is rarely that an owner who has a truck with a market value worth considering desires to part with it or to purchase a new one until he has derived all of the good contained in his original investment.

Yet because dealers have permitted themselves to be made the dupes of craftier business men, they have been forced, or thought they were forced, to take in all sorts and kinds of ill-conceived and ill-conditioned relics in order to make a large portion of their yearly sales.

The shrewd buyer, indifferent to the merits of the different trucks and on bargaining bent, peddles his junk among the more needy of the dealers and finally awards the contract to the one offering him the greatest allowance on his truck, consistent with the list price which is cut. In some cases it is charged that manufacturers purposely place their lists high in order to permit of great gashes to be made to delight avaricious buyers.

The only rational and at the same time practicable solution which has been offered is the general adoption of a policy of taking in only trucks of the same make as that sold, these chassis to be thoroughly rebuilt and sold with a factory guarantee. Trucks of other makes, it is proposed, shall be stored and sold for the prospect, but in no case shall they enter into the sales contract. If desired, the representative of or the manufacturer may buy them up, rebuild them and resell them to protect his own good name.

This would prevent inflated valuations on junk and would place the second-hand and rebuilt trade on a sound basis. One hears much of the evils of Gypsie horse-trading methods on the new truck market; but there is too little consideration of the final disposition of the old vehicle. It is presumed that a certain proportion of these wrecks are sold for junk—but only in cases where no buyer can be found. Who are the buyers of second-hand trucks?

There are some who feel that certain dealers have pursued very unethical courses in duping ignorant peddlers, etc., and small-town merchants.

If all second-hand buyers were made aware of a standard policy for the handling of used trucks which provided for a guarantee on rebuilt ones and no warranty whatever on unrebuilt ones, each manufacturer rebuilding his own trade-ins, these buyers of second-hand trucks would not only be saved much useless waste of money and effort and in some cases business ruin, but they would constitute an army of very promising future buyers.

A good rebuilt truck would be the means of saving and earning sufficient to purchase a new truck in a comparatively short while—by the time the rebuilt one had worn out, at least—instead of perhaps forcing the unfortunate dupe to the wall, or so embittering him against the motor truck industry that he would either fail to buy again at all, or if he did buy to demand the concessions, allowances, reductions, free service, etc., which today constitute the bane of the business.

In general the sum of opinion is that trading-in of old trucks is on a much better plane than it has been in the past, but this is because the factories have mostly washed their hands of the matter and left it entirely to the dealer. To the dealer the second-hand truck problem is still a gordian knot.

BUSINESS MORE LOCALIZED

Class of Market	Percentage 1916	1917
National, the whole country	16.0	33.4
Sectional, a group of states	37.4	26.0
International, domestic and foreign	37.3	24.6
Local, confined to city or county	2.6	11.7
State, confined to one state	6.7	4.3

MANY NEW CHASSIS MODELS

1917 Offerings	Percentage 1917
Continuing 1916 line	51.0
Adding new models	49.0
Changes in old models	55.0

MORE COMPLETE MANUFACTURE

Method of Manufacture	Percentage 1916	1917
Assembled from standard parts	65.6	63.5
Manufactured by builder	11.0	23.0
Partially manufactured	23.3	13.5

TIME SELLING INCREASES

Credit Policy	Percentage 1916	1917
Have a credit scheme	46.0	64.0
Refuse credit	40.5	21.4
Leave matter to dealers	2.7	8.6
Rarely grant credit	4.0	2.8
Leave it to banks and brokers	5.4	1.6
Extend credit locally only	1.4	1.6

TRAILERS GAIN FAVOR

Trailer Policy	Percentage 1916	1917
Approved	42.0	64.6
Not approved	22.0	28.3
Indorsed under restrictions	17.5	5.6
Noncommittal	18.6	1.5
Provision made for attachment	18.0	36.5

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Free service has been rather well disposed of by the N. A. C. C. standard service policy, the outgrowth of the motor truck convention held in Detroit 19 months ago. Any manufacturer who to-day goes beyond the same provisions of this policy is needlessly fostering wrong ideas in buyers minds and hurting his own business in the long run if not doing it immediate injury.

Free demonstrations are no longer a serious problem and any dealer who allows himself to be imposed upon in this manner has none but himself to blame. Buyers seldom demand free demonstrations. They know that trucks will do the work and that in this age of standardization, most trucks are alike in mere performance. They are more interested in reputations for durability, economy of operation and reliability. They are more interested in values and in the proper sort of service.

Proper Sale Matter of Knowledge

Over-rating and mis-application are evils which are the result of ignorance or indifference on the part of salesmen. The industry, in self-protection, is still forced to extreme measures in protecting trucks from abuse through overloading and overspeeding. Every manufacturer knows that trucks sold where they do not give the proper service to their owners are worse than lost sales. The problem is one of education of both the salesman and the user—especially the latter.

As this publication has consistently insisted ever since the question first assumed serious proportions, time-payment sales must come. The truck industry must decide whether to do a cash business and content itself with a narrow field or a rational credit business and do a large business.

That the industry has been forced to the same conclusion is indicated by the fact that some concerns admit that 90 per cent of their business is done on a time-payment basis. For many years there were grave evils in the time-payment scheme of doing business because the banks and credit brokers were not possessed of the confidence in the truck which they have since acquired.

Formerly the banks were greatly opposed to the huge investments which were being made in motor cars and made no distinction between the passenger car, which is bought largely for pleasure, and the truck, which is bought for profit.

To-day a number of strong financial institutions have undertaken to relieve the dealer of the burdens and risks of credit sales without imposing any additional tax upon the purchaser. Practically without exception these schemes are working out to good advantage. It is stated, although there seems to be no means of substantiation, and so therefore, it is not possible for THE COMMERCIAL VEHICLE to stand back of the statement, that 75 per cent of the trucks sold in this country to-day are paid for on time.

From a half to a third down is demanded by most of the conservative companies and payments run not to exceed one year. Of those who handle credit sales, the majority find it thoroughly successful, foreclosures on trucks upon which the payments have not been kept up being so rare that they are negligible.

Last-minute Price Changes of 1917 Motor Trucks

Since Publication of THE COMMERCIAL VEHICLE'S Specifications

PRICE CHANGES made on 1917 motor trucks since the publication of THE COMMERCIAL VEHICLE'S specification tables of American motor trucks on November 1, 1916, are given in the tabulation to the right. The various makes and models whose prices have been increased or decreased are arranged alphabetically for easy reference. The old and the new prices, the former as printed in the specifications of November 1, 1916, are given, with two columns at the right to indicate the amount of increase or decrease in each case.

Prices of vehicles which are not included in this table remain the same as published in the November 1, 1916, issue of THE COMMERCIAL VEHICLE. The table given herewith, therefore, forms a valuable record for use with the specification tables throughout the coming year. It may be clipped from this issue and pasted at the front of the specification tables or the data given on it transferred to the tables in ink to give an up-to-the-minute data sheet of the trucks offered on the market January 1, 1917.

Price changes in the great majority of cases have meant price increases rather than decreases, as is shown by the figures of the accompanying table. This has been caused principally by the increased prices now prevailing in the material markets. Many of the truck manufacturing concerns have offset the rise in the cost of materials by a greatly-increased production, better factory management and increased plant efficiency. Yet it is more than likely that the prices of many of the trucks not listed herewith will be increased if the prices of materials continue to soar as they have done during the past year.

It will be noticed from the table that the prices of trucks of both small and large capacity have been increased so that there does not appear to be any one size of commercial vehicle whose price has been raised more than any other. The increases range from 2 per cent up as high as 10 per cent in some instances. Price decreases are explained by greatly-increased production more than sufficient to offset the higher cost of materials.

Name and Model	Capacity In Pounds	Old Price	New Price	Price Increase	Price Decrease
Atlas..... 17	1,000	$690	$750	$60	....
Bessemer..... G	2,000	975	1,095	120	....
Briscoe 4-24	1,000	665-c*	700-c*	35	....
Brockway..... O	2,000	1,450	1,500	50	....
Brockway..... J-2	3,000	1,825	1,875	50	....
Brockway..... K-2	4,000	2,125	2,250	125	....
Chase..... A	2,000	1,650	1,725	75	....
Chase..... C	3,000	1,950	2,025	75	....
Dart..... E	3,000	1,800	1,850	50	....
D-E..... Junior	1,250	895	975	80	....
D-E..... Senior	2,000	1,450	1,500	50	....
Diamond-T..... J-4	3,000	2,050	1,900	....	$150
Doane	1,400	4,500-c	4,750-c	250	....
Dorris..... I-B-W	4,000	1,990	2,185	195	....
Fargo..... N	4,000	1,700	1,390	....	310
Hall†	10,000	3,400	3,600	200	....
Horner.....	3,000	2,250	2,350	100	....
Horner.....	4,000	2,650	2,750	100	....
Horner.....	6,000	3,200	3,300	100	....
Lippard-Stewart MW	1,000	1,000	925	....	75
Mack..... AB	2,000	2,000	2,150	150	....
Mack..... AB	3,000	2,350	2,500	150	....
Mack..... AB	4,000	2,700	2,800	100	....
Mack..... AC	7,000	3,400	3,650	250	....
Mack..... AC	11,000	4,000	4,250	250	....
Mack..... AC	15,000	4,500	4,600	100	....
Overland..... 90	800	625-c*	675-c*	50	....
Overland	1,200	725	800	75	....
Packet.....	600	350	325	....	25
Palmer	2,000	1,350	1,500	150	....
Palmer	4,000	1,975	2,150	175	....
Palmer-Moore.... M	2,000	1,350	1,075	....	275
Riker	6,000	3,500	3,600	100	....
Riker	8,000	3,650	3,750	100	....
Sterling	14,000	4,750	5,250	500	....
Studebaker..... SF	1,000	785	850	65	....
Studebaker..... 7	2,000	1,100	1,200	100	....
Vim..... 20	1,000	635	645	10	....
Stanley	1,500	1,550	1,775	225	....
Stanley	2,500	2,000	2,200	200	....

c—Complete with body.
*With express body.
†Chain-driven model.

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Truck Fees Boosted in Rhode Island

Stringent Measure Puts Heavy Burden on Providence

PROVIDENCE, R. I., Dec. 28—The new motor vehicle law passed by the last legislature goes into effect January 1. It now provides for the registration of all commercial vehicles at the beginning of the year instead of having the time run on one year from when the license was issued. There is a big change in the rating of the motor trucks. Under the law that held good until now all motor trucks were taxed a flat fee of $7. Last spring when the drive was made to increase fees the trucks were made to bear the heavier burden. While the motor cars were advanced only a few dollars, the small cars being changed so that the $5 limit was dropped to 15 horsepower, the truck dealers and owners found the legislature anything but anxious to foster their product. As a result here is what the truck owners now have to pay:

All with a capacity of 1 ton or less, $7.
One ton to 2 tons, $10.
Two to 3 tons, $13.
Three to 4 tons, $16.
Four to 5 tons, $20.
Five to 6 tons, $24.
Six to 7 tons, $28.
Seven to 8 tons, $32.
Eight to 9 tons, $36.
More than 9 tons, $40.

That is a higher rating than is paid in any of the other New England States. Just how the law is going to work out between Rhode Island and Massachusetts on one side and Connecticut on the other is problematical. Rhode Island is very loath to grant reciprocity privileges, and its 10-time limit has caused much bother. Now a Massachusetts or Connecticut truck that runs to Providene, for example, will have to pay a big fee to do business, for after 10 trips it must take out a year's registration. When the fee was only $7 it did not amount to very much, for with, say, an $8 fee in Massachusetts on a 2-ton truck, or $11 for a 3-ton in addition to the Rhode Island $7, it kept it within the $20 limit. Now with the increase piling up it will not be relished. That the Rhode Island truck owners will be held up in Massachusetts and Connecticut as a retaliatory measure is now a foregone conclusion and the spirit of amity between the States will be given a bad set-back.

The new law carries a further provision aimed at trucks. It allows the State Board of Public Works to make regulations from time to time governing the use of devices on the wheels of motor vehicles which may have a tendency to injure the roads. There is a provision that prevents drivers from passing street cars on the side where the door is open to let off or take on passengers.

O.K. HUDSON TEAM TUBE

WASHINGTON, D. C., Dec. 20—The War Department has officially sanctioned the construction of a vehicle tunnel under the Hudson river from Thirteenth Street, Jersey City, to Canal Street, New York City. A permit has been issued the New Jersey Interstate Bridge & Tunnel Commission providing that the tube must be 50 feet below mean sea level.

The cost of the tube will be about $11,000,000, but it will save motor truck users many times this amount in quicker traffic and saved ferry tolls. New York City and Hudson and Bergen counties, N. J., have approved the scheme, and it only remains for Essex county to consent.

REPUBLIC REACHES COAST

LOS ANGELES, CAL., Dec. 22—The Republic Dispatch, 1,500-pound delivery truck which left the home factory at Alma, Mich., for the trip overland to Los Angeles, reached here at noon December 14 after many adventures along the way. It was driven by Lester Poyer and H. L. Dewey. Poyer is the son of D. F. Poyer, formerly manufacturer of Menominee trucks and now Republic agent here, and Dewey is a factory representative for the Republic Motor Truck Co., Alma, Mich.

The tour was undertaken as a combination test of the truck and as an introduction of it to the various dealers along the route. The chassis was one of five experimental ones built in the experimental shops previous to starting production. Although accidents made it necessary to ship the truck portions of the distance by boat and rail and towing was resorted to on one occasion, the greater part of the journey was made under the vehicle's own power.

The mileage, 4080, was considerably greater than would have been traversed by a touring party, since the calls on the dealers *en route* required that a circuitous path be travelled. This also led to many stretches of bad roads which made the trip especially difficult.

On the last leg of its journey, from Bakersfield, Cal., into Los Angeles, it stopped off long enough at Universal City to be filmed for the Universal moving picture news service, and then reached Los Angeles in time to join a parade of Republic trucks.

The route was through Grand Rapids and Muskegon, Mich., Chicago, Peoria and Springfield, Ill., St. Louis and Hannibal, Mo., Keokuk, Burlington, Davenport, Cedar Rapids, Belle Plains, Marshalltown and Des Moines, Ia., Omaha and Nebraska City, Neb., Leavenworth, Kan., Kansas City, Mo., Topeka and Wichita, Kan., Denver, Col., Salt Lake City, Utah, Ely, Nev., and Mojave, Bakersfield, Fresno and Los Angeles, Cal.

No attempt was made at a speed record, for the truck made frequent and protracted stop-overs demonstrating the vehicle to agents. A complete, illustrated, exclusive article describing the trip across the western half of the map will be published in the next issue of THE COMMERCIAL VEHICLE.

G. M. C. TRUCK ON DOUBLE TRANSCONTINENTAL TRIP

LOS ANGELES, CAL., Dec. 16—William Warwick completed a double transcontinental trip in a 1½-ton G. M. C. truck on arrival at Los Angeles, at the headquarters of Don Lee, California distributor of G. M. C. trucks. This is the same truck Warwick drove, accompanied only by his wife, across the Northern route from Seattle to New York, carrying a load of Carnation milk shipped under the auspices of the Seattle Chamber of Commerce.

Warwick hurried north, driving his truck from Los Angeles to Seattle, to complete the trip of twice across the country, and also nearly the whole length of its Pacific boundary, in time to ship the truck East for exhibition at the New York Show.

Winter S. A. E. Meeting to Be Efficient

Barrett and Coffin, Banquet Speakers, January 11

NEW YORK CITY, Dec. 29—Clockwork precision is planned for the conduct of the professional sessions of the mid-winter meeting of the Society of Automobile Engineers, January 11. These sessions will begin at 12:30 and will be conducted by the clock, seven papers on four different subjects, including motor vehicle, airplane and tractor branches of Engineering being presented in the one afternoon. This will be made possible by limiting the reading to an abstract and supplying all members with copies of the papers to be studied in advance. Discussion will also be definitely limited, the beforehand study of the papers being relied upon to prepare the members for crisp and to-the-point presentation of any arguments to be advanced or questions to be asked.

The professional session will be preceded by meetings of the various divisions of the standards committee on January 9 and 10 and by the business meeting on Thursday morning, January 11.

As has previously been announced, Thursday will also see the annual banquet at the Hotel Biltmore, followed by a performance of Ziegfeld's Midnight Frolic atop the New Amsterdam Theater exclusively for S. A. E. members and their guests.

John Barrett, director general of the Pan-American Union, will be the speaker of the evening at the banquet. Mr. Barrett will deliver an address on "Pan-American Commerce; Our Opportunity." Mr. Barrett speaks from experience gained in the diplomatic service for 23 years, part of which was spent as U. S. minister to the Argentine.

Howard E. Coffin, chairman of the Committee on Industrial Preparedness of the Naval Consulting Board and now a member of the Advisory Commission of the Council of National Defense will also speak.

Practically the entire accommodations at the banquet have been reserved and for weeks no more space has been available at the Frolic.

FIRST CARBURETER CONVENTION

DETROIT, Dec. 23—The first dealers' convention ever held by a carbureter manufacturer will be held at the Park Avenue Hotel, New York City, on January 10 and 11 by the Master Carbureter Corp., Detroit. This meeting will be for the purpose of instructing dealers in Master carbureters as to the merits of the different features of their construction. It will be conducted in regular convention order with papers by nine speakers, discussions of various problems, demonstrations of installing Master carbureters and a closing banquet. Out of 200 invitations sent to dealers in all parts of the country, in 10 days fifty replies have been received.

M. T. A. ADMITS USERS

PHILADELPHIA, Dec. 21—Radical changes in the character of membership are to be made by the Motor Truck Ass'n of this city. This was recently decided and at last night's meeting a new set of

(*Continued on page* 14)

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Increased Production Possible

WITH approximately 100,000 motor trucks built in the calendar year of 1916, a simple problem in mathematics gives an average of two trucks per day for the 200 truck-producing factories at present in operation. This is a low average, and yet an annual output of 100,000 trucks is quite large considering production in former years. With 200 factories producing an average of only two machines per day for each of the 250 working days of the year it can scarcely be said that truck manufacture has even yet reached the production stage. It scarcely can be said that production methods have taken hold in the factories in the same sense that they have in the making of passenger motor cars, where outputs of several hundred machines per day have been made possible by fitting factories with definite systems for the rapid handling of parts and components. If we estimate that six workmen are sufficient to put together the units in an assembled truck in one day, it only requires a working force of twelve men per factory to give the average of 2 trucks per day which have been produced in the past year.

Going a step further in the possibility of increasing the truck output to 200,000 machines for 1917, there should be little difficulty in this, as it will only mean increasing the average factory output from 2 to 4 machines per day. Due to a very large percentage of trucks being assembled, it does not call for a heavy added expense in factory or equipment to double the output as outlined. It will not call for a heavy financing problem to bring the output of 1917 up to the 200,000 mark. Heretofore truck production has been thought of in figures of tens of thousands, but we have now got both feet on a new threshold and henceforth we must think in figures of hundreds of thousands.

Parts makers on whom the heaviest load of increased production will fall have and still are gradually increasing facilities and adding to their numbers to take care of the 200,000 output. The past year has witnessed a steady increase in the number of concerns building radiators, axles, steering gears, motors and other parts. New concerns are entering these fields nearly every fortnight and there is no cloud of any importance on the manufacturing horizon that would create a symptom of alarm. The manufacturing setting appears ready for any increase that the merchandising demand will require.

A Feasible Army Truck

THE vigorous efforts of the government through its military department to insist on a special design of motor truck for army use is a subject of major importance and one calling for concerted consideration by truck manufacturers. While the government is perhaps right in insisting on a more robust type of vehicle to meet such extreme service as on the Mexican frontier, it is debatable if that situation was confronted properly. Many believe that it was handled in rather an unsystematic manner. In war as well as in peace you cannot use motor trucks without roads. You cannot operate steam locomotives efficiently without the steel track, and you cannot operate trucks properly without roads.

It is just as much a part of the work of an army to build roads for its transport columns as it is to have the vehicles in those columns. On the Mexican frontiers an example will serve to illustrate how hopelessly bad was the road building situation. In one route was a stretch of road with a particular boulder over which every truck passed. Hundreds of trucks per day passed over that particular boulder to their injury, yet no effort was made to remove the boulder. Trucks were repaired, and new tires put on because of the boulder, but no effort made to remove the cause of the trouble.

If the plan of running an army is to make the truck go wherever it may be necessary to move an army, then it may become the work of engineers to design trucks that will cross the unroaded parts of the Rocky Mountains. This is an extreme situation, but varies only in degree with some present-day ideas of truck work.

The War Department must consider road building a part of transportation. It is essentially so. The

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aim is not to build trucks that can withstand any service, but rather to build a good truck, equally good for commerce as for war, and then bring roads up to a symptom of truck requirements.

The armies in the field in Europe have done this. The tanks are about the only example of vehicles intended to go any place. They have been built for a special purpose. Our army may require many vehicles for specific uses, but the great masses of motor vehicles for army transport must be conventional types, as they are in Europe to-day. A vehicle to transport infantry, to transport ammunition, to transport foods, to transport a hundred of the other army necessities does not require to differ materially from a standard truck for commercial uses. In times of war the demand for such vehicles is so above the average that it can only be satisfied by a general impressing of commercial vehicles into service. When hostilities occur you are only gumming up the works with special government jobs for such uses.

The government can do some good work in insisting upon some of the major considerations in truck interchangeability. For example: It would be possible to standardize motor support positions so that if it became necessary to mount a motor of another make in a certain truck, it could be accomplished without having to remake the frame, or add new frame members to take the motor arms. The same applies to gearbox mounting; and it might be desirable to standardize axle mounting so that a front axle from one make would readily admit of mounting on a truck of another make. Such interchangeability would not infringe on the limits of good design, and would be invaluable factors in the war zone.

On the other hand, we cannot see any value in such government specifications as insisting on a certain alloy in crankshafts, in insisting on a certain degree of crankshaft finish, in insisting on a certain material in gears, or insisting on certain tolerances in certain motor and other parts, which would call for special factory practices and perhaps not prove worth while.

If for argument we assume that the government lays down its exacting specifications, what is the value?

Truck manufacturers will not spend the necessary hundreds of thousands of dollars in the development of such models without some assurance of government sales. The government will thus have to place orders or adopt the alternative of adopting some form of subsidy. Should neither case be followed the specifications would lie in waiting until some aggressor issued the war challenge and then would follow a chaotic scramble for vehicles. There would be no time to make the special vehicles, and the War Department would have to fall back on the commercial vehicles throughout the country. They would have to be impressed into service.

It is because of these possibilities that due recognition of the importance of the government demand for special military designs should be well weighed. It is no matter to trifle with. It is a question involving broad businesslike considerations, and the truck industry should act as a unit in presenting the commercial phase of the problem to the War Department.

The Ford of Truckdom

SOME day the Ford of the truck field will be with us. Some engineering genius who happily combines the last word in business sense with engineering talent will present to the waiting vehicle world the Ford of truckdom. He will have thrown tradition to the four winds, will have turned his face in the direction of efficiency and will have developed a job which, while not in any wise perfect at the start, will contain the germ of a new thought in truck manufacture.

Unfortunately we are all too much the creatures of tradition. The memories of yesterday and the practices of to-day fix the boundaries of our to-morrows. We cannot shake off the cloak of past practice. To-day an average truck chassis built to take a useful load of 1 ton has a weight of approximately 3100 lb. This figure has come to represent the zone of conventional practice. It has become a standard of truck engineering. There is no reason but experience for retaining such a standard. The day will come and perhaps is near at hand when the engineer will come forward with a chassis of 2500 lb., perhaps 2200 lb., and it may be 2000 lb., that will adequately handle the 2000-lb. load.

That was virtually what Ford did in the passenger car field. He dreamed the dream of utility combined with light weight. He had to set his face in a diametrically opposite direction to do this. But he did it and his reward has been shown in annual profits. The same goal is possible of attainment in the truck field.

It will call for a real engineer to work out the job. He may have to depart very widely from conventional practice, but if his departures are backed up by sound common sense engineering then his success is assured. Ford introduced many radical constructions to accomplish his end. He used block castings in conjunction with the crankcase top, new magneto, cross springs, different steering and many other details. He set out with a definite object and succeeded.

The Ford of the truck field will first have to broadly analyze the field. He will have to set a price goal, a performance goal and also a weight goal. He must realize that it is poor policy to consume too much of the truck power in carrying the truck load. He will have to design to meet the demands of production, not of two or four trucks per day, but of perhaps hundreds per day. His problem will be that of obtaining the best engineering construction in the most direct method. His work must be like the straight line, the shortest and most direct path between two points.

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(*Continued from page* 11)

officers were elected. A record attendance of 100 was present at the Hotel Adelphia session to hear addresses by Col. George Penrose, Q. M. C., U. S. A., who spoke in appreciative terms of the work of American motor trucks in our border military operations, and Hon. Eugene C. Bonniwell, judge of the Municipal Court of Philadelphia, who stated that more stringent laws were needed to regulate the qualifications of drivers.

The membership of the association heretofore has been made up entirely of those in the local trade. Just as was the experience of the Motor Truck Club of America, in its early years, however, the association has found it impossible to keep out the user and at the same time accomplish the results for which it was organized. Accordingly a campaign for 500 owner-members is about to be launched. The present membership will be divided into two sides under two captains, President-elect Doolittle and H. C. Adam. The team having secured the greatest number of new members at the time the 500 mark is reached will be privileged to dine at the expense of the others. The individual member getting the greatest number of owner-members will receive a $50 gold watch.

New officers elected were: O. W. Doolittle, Foss-Hughes Co., president; H. M. Coale, Autocar Co., vice-president; J. D. Howley, White Co., treasurer, and W. H. Metcalf, George W. Houk Co., secretary.

On the board of governors are: Lee J. Eastman, Packard Motor Car Co.; Edward M. Burnshaw, Jr., Girard Automobile Co.; E. R. Whitney, Commercial Truck Co.; W. Ross Walton, Firestone Tire & Rubber Co., and D. H. Zimmermann, International Harvester Co.

U. S. TO HAVE TANKS

WASHINGTON, D. C., Dec. 16—Chief of Ordnance of the Army Crozier, in a report just made, declares that the United States Army soon will be equipped with caterpillar tractors similar to those in use in the British army, the so-called tanks. The report of General Crozier says armored cars, with two revolving turrets, mounted with machine guns; armored machine guns, equipped motorcycles and individual armor for the men of the ranks, also are under consideration.

Along this line the quartermaster general of the army, in a report, shows that $2,175,000 was spent by the army on motor truck equipment alone after the expedition was ordered into Mexico in pursuit of Villa.

The quartermaster general, in testifying before the House military committee, said that the use of trucks for transportation purposes has more than tripled the mobility of troops. He added that had General Pershing only mule trams to use in moving his command he could not have traveled half the distance he did in Mexico.

Col. Chauncey Baker, of the Quartermaster's Corps, testified that a motor truck made from 60 to 120 miles a day against a possible maximum of 18 for mule teams. A four-mule team, he added, would eat in 4 days all the fodder it could haul. It was shown by Colonel Baker that the army now has 2,600 motor trucks of several satisfactory types, and that the machines show less than 20 per cent depreciation in efficiency, despite the severe tests imposed by the hard service they were put to.

Truck Club Profits By Harmony With City

Police Promise to Consult Users on Truck Matters

NEW YORK CITY, Dec. 21—Police Commissioner Arthur H. Woods and Commissioner of Street Cleaning John T. Fetherston, both of New York City, addressed the Motor Truck Club of America at its annual meeting held at the Automobile Club of America, here last evening. Owing to its closeness to Christmas and to bad weather the attendance was small, but the talks by the distinguished guests and by the officers of the club in reviewing the work of the past year were interesting.

Commissioner Woods expressed his appreciation of the co-operation of truck owners in the handling of the snow problem last winter and this and for their support of his unsuccessful attempt to provide examinations for competence for drivers of motor vehicles. In his opinion his failure to secure the passage of the measure because of unconstitutionality argued nothing against the need for just such regulation. He stated that in the month of November there were twenty-five deaths in street traffic accidents on New York streets in which motor trucks were involved. Most of these, he admitted, were so-called unavoidable, that is, unavoidable from the driver's standpoint, being clearly the fault of the pedestrian, most of whom were old people or children. In only two cases was the speed of the truck at all responsible.

Stating that so long as he had charge of it the police department would under no condition undertake any legislation or regulation affecting them without consulting the truck users of the city, either directly or through the Motor Truck Club, the commissioner then outlined a set of rules for truck users to follow to aid the police department in reducing the hazard of our streets:

1—Use every possible care in the selection of drivers.

One death last month was caused by a driver who had never driven a motor vehicle before.

2—Look after the mechanical condition of the truck.

A bad tire caused two deaths by catching in the street car track and diverting the course of the truck up over the sidewalk and onto the stoop of a house where two children were at play.

3.—Don't rely too much on the horn to clear the road.

In November five deaths were caused in New York by the bewilderment of old men and boys by the excessive use of startling-sounding horns.

4—Be ever vigilant.

Most of the accidents are caused by the carelessness of the pedestrian. Six of the November deaths were caused by pedestrians not seeing where they were going, due to their reading newspapers as they crossed the street or to the carrying of umbrellas in such position that traffic was obscured.

Commissioner Woods believes in regulation of the pedestrian and for this reason has issued his famous safety posters. He urged in closing that both pedestrians—which we all are much of the time—and drivers of vehicles should provide margins of safety; should give the other fellow credit for just a little less alertness and good judgment than we ourselves possess.

Commissioner Fetherston described completely the New York snow fighting method, the most interesting part of which description was of that portion wherein trucks were used. His men are divided into sections, as follows:

1—The snow fighting force. This detachment goes out as soon as the storm starts and endeavors to prevent the main thoroughfares becoming clogged.

2—The snow removal force. This force goes out after the storm and removes the snow which has fallen as rapidly as possible. In this work 1,800 horse-drawn street cleaning carts and 700 ash carts are used.

With the first force are 120 motor trucks equipped with standard detachable snow plows, which keep the main avenues clear and push the snow off to the side. As an emergency reserve, motor truck owners are invited to volunteer trucks for service without compensation in the second division.

The problem may be understood when it is realized that New York City has 915 miles of 60-foot streets, a road long enough to go from New York to Chicago.

Mr. Fetherston brought the fact to light that horses in New York City had decreased 50 per cent in a year as against an increase in motor vehicles of 33 per cent.

At the business meeting preceding the talks by the city's spokesmen, Ellis L. Howland, secretary of the club and one of its first members, stated in his annual report that 1916 had been an owners' year. Out of a membership of 195 active members, only 60 are affiliated with the trade, and the club is out of debt.

The change in the By-Laws early in the year by which further trade memberships were banned, although the then-existent members were retained, caused a reduction in membership, but the gross income had been increased by an increase in dues from $10 to $25. Three hundred members, stated Mr. Howland, formerly paid $3,000 in dues. Now 200 pay $5,000.

The present officers were re-elected with the exception of vice presidents. The 1917 officers are:

Roderick Stephens, president; Haywood P. Cavarley, first vice president; George H. Pride, second vice president; David C. Fenner, third vice president; Ellis L. Howland, secretary, and Nat Mallouf, treasurer.

Coming Commercial Vehicle Events

Jan. 9	New York City, National Automobile Chamber of Commerce. Annual Banquet, Waldorf - Astoria Hotel.
Jan. 10	New York City, Annual Banquet, M. A. M., Waldorf-Astoria Hotel.
Jan.	New York City, Export Conference, N. A. C. C., Transit Building.
Jan. 8-10	New York City, Delivery Conference. *Dry Goods Economist*, Thirty-ninth Street Building.
Jan. 9-11	New York City, Annual Winter Meeting, Society of Automobile Engineers, Engineering Societies' Building.
Jan. 11	New York City, Annual Banquet, S. A. E., Hotel Biltmore.
Jan. 13-20	Montreal, Que., Can., Montreal Motor Show.
Jan. 27-Feb. 3	Portland, Ore., Motor Vehicle Show, Dealers' Motor Car Assn., Armory.
Feb. 17-24	Newark, N. J., Passenger Car and Motor Truck Show, First Regiment Armory.
Feb. 3-10	Minneapolis, Minn., Tenth Annual Auto Show.
March 3-10	Boston, Mass., Fifteenth Annual Motor Vehicle Show, Mechanics' Building.

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Continental Service Universalized

Stations All Over Country to Render Factory Service

DETROIT, Dec. 27—The Continental Motors Co., this city and Muskegon, will establish service stations in all of the principal cities in the United States. The company has closed large contracts in both New York and California for the first of the service stations. The establishment of the New York Service agency was reported exclusively in THE COMMERCIAL VEHICLE of December 15. While the details have not been disclosed, an official of the company states that the plan includes not only the policy of serving the owner but also the manufacturer in solving his service problems.

A special meeting of the stockholders of the company will be held December 30 for the purpose of acting upon the proposal to sell the assets, business and good-will of the company to the new proposed corporation to be formed under the reorganization plan.

WINTHER ELECTS OFFICERS

KENOSHA, WIS., Dec. 18.—The Winther Motor Truck Co., Kenosha, Wis., organized recently with $300,000 capital to manufacture motor trucks, has perfected its organization with the election of these officers: President and general manager, Martin P. Winther; vice-president and factory manager, William Martinson; secretary, treasurer and sales manager, Walter D. Rightmire; directors, M. P. Winther, William Martinson, W. D. Rightmire, Jerry W. DeCou and Walter M. Burke. The truck will be known as the Winther. A specialty will be made of fire-fighting apparatus, and the Winther company has effected an alliance with the Peter Pirsch Co., Kenosha, Wis., fire apparatus, for the joint production of such cars, to be trade-marked Pirsch-Winther. A factory will be erected by the Winther company immediately on a 4-acre site just purchased at the western limits of Kenosha.

PENN COUNTIES TRUCK BUYS LAND

PHILADELPHIA, Dec. 22 — The Penn Counties Motor Truck Co., supported by New York financiers, has purchased a tract of land along the Central Railroad of New Jersey at Allentown, Pa. The work of erecting a plant has already been started. Martin E. Kern, one of the organizers of the International Motor Co., is vice-president of the new enterprise, which is capitalized at $500,000. Trucks of ½ to 2-ton capacity will be made. The company plans to turn out 2,000 trucks complete within the coming year.

METZ 1-TONNER $695

BOSTON, MASS., Dec. 26—The new 1-ton Metz truck, which has previously been announced, is now about ready for production in the factory of the Metz Co., Waltham, Mass. It will be conventional in appearance, but will incorporate one brand new feature, namely, an internal-gear-driven axle driven by friction. This element will be to all intents a combined friction change-speed and an internal-gear-driven axle. The rest of the chassis will be standard saving that there will be no clutch or gearset.

The axle will consist of a solid bar, carrying a steel subframe, pivoted at its front end to the frame and rigidly attached to the axle at the rear. The jackshaft will be carried in the usual position and will be exposed at its middle. The differential, if any is fitted, will be at one side, the friction-tired wheel sliding on its exposed jackshaft. The friction disk will be at the end of the driveshaft, where it may be pressed into or out of contact with the wheel. A suitable lever arrangement will permit the wheel to be adjusted to provide the different speeds and a reverse.

The chassis will have a 130-inch wheelbase, a 3⅞ by 4 block-cast engine, magneto ignited, pneumatic 32 by 3½ front tires and 34 by 3½ solid rear tires. It will sell for $695.

NEW SELDEN 1-TONNER

ROCHESTER, N. Y., Dec. 20—A new 1-ton Selden truck has been produced by the Selden Truck Sales Co., of Rochester, which is practically identical with the older 1-ton model except that it has a Russel internal-gear-driven rear axle. The other 1-tonner has worm drive. This is the second Selden to be equipped with internal-gear drive, the other being the 2-tonner. As is the case with the 2-tonners, the internal-gear-driven 1-tonner sells for less than the worm-driven one, $1,385 as against $1,700.

LANSDALE LEAVES DENBY

DETROIT, Dec. 11—Henry Lansdale has resigned the vice-presidency of the Denby Motor Truck Co. Mr. Lansdale has been the vice-president and general manager for the company since 1915.

BOGUS DISTRICT MANAGER OF COMMERCE CO. SWINDLES DEALERS

DETROIT, Dec. 23 — The Commerce Motor Car Co., truck manufacturer, of this city, has wired THE COMMERCIAL VEHICLE as follows;

"An imposter claiming to represent us as district manager is operating in Pennsylvania, West Virginia, and Ohio, passing bogus checks on dealers and hotel men. These checks are printed with our name and are on the First National Bank of Detroit. Checks are signed F. M. Wilson, manager of sales. The trade should be on the lookout for such a person and wire us promptly in case he is located.—(Signed) Commerce Motor Car Co., Detroit, Mich."

SPECIFICATION CHANGES IN GARFORD TRUCKS

LIMA, OHIO, Dec. 26—Garford motor trucks, made by the Garford Motor Truck Co., of this city, differ in the following respects from the specifications as published in the November 1, 1916, issue of THE COMMERCIAL VEHICLE:

1—Frames of all models are semi-rigid instead of semi-flexible.
2—Tires, rear, on the 1-tonner are 36 by 4 instead of 36 by 3½.
3—Crankshaft bearings on the 3½-ton model are four in number instead of three.
4—Governors on the 5- and 6-ton chassis are of the centrifugal instead of the suction type.
5—Foot brakes on the jackshaft of the 6-ton unit are of the external instead of the internal type.

New Highway Tractor to Be Built

Fisher, Allison and Campbell in Indianapolis Firm

INDIANAPOLIS, Dec. 19—The Highway Tractor Co., capitalized at $2,000,000 and headed by Carl G. Fisher, James A. Allison and Henry F. Campbell, of this city, was incorporated here last week to manufacture tractors with 10-ton drawing power for highway and military use. Work is to be started immediately on a site of 25 acres near the Indianapolis Motor Speedway on the first unit of a plant to cost $200,000. The company expects to have the plant in operation by May 1, employing 300 men, and working on material that has been purchased for the manufacture of 5,000 tractors next year.

Charles G. McCutchen, who recently resigned the presidency of the Ross Automobile Co., of Detroit, will be president of the Highway company, and Mr. Fisher will be secretary-treasurer. Plans call for the construction of a concrete and steel plant 200 by 400 ft. The tractor will feature many of the inventions of B. R. Parrott, of Jackson, Mich. A. E. Schaaf, of Poughkeepsie, N. Y., recently with the Fiat Automobile Co., and formerly manager of the Pope-Toledo Automobile Co. of Toledo, Ohio, will be factory manager. Other stockholders in the company are Louis Goodhart, of St. Louis; Dr. M. N. Stewart and Forrest C. Badgley, both of Jackson, Mich.

The company announces it probably will build a tractor with a 5-ton drawing power in the near future, and later may enter the farm tractor field. The price of the 10-ton drawing power machine will be approximately $1,250.

WHITE CELEBRATES IN NEW PLANT

CLEVELAND, O., Dec. 26 — A housewarming on a gigantic scale was staged at the White Co.'s plant here on December 16, when 6,000 persons were present at a reception given by the concern to celebrate the completion of its latest addition to the motor truck plant. With the factory running full blast, the reception started at 8:30 a. m. and lasted until late at night, when a dance was given to 8,000 persons.

The new building is 240 by 304 feet in size, one story high with a saw-tooth roof, corresponding in style with the rest of the White plant.

TO BUILD TRUCKS IN CORK

MANCHESTER, ENGLAND, Dec. 10—The city park of Cork, Ireland, is to be used for the manufacture of commercial vehicles. The Trafford Engineering Co., this city, has taken an option on that park, upon which it will erect a plant to cost between $1,000,000 and $2,000,000. The company plans the manufacture of worm-drive trucks on a large scale. It will employ 2000 men.

CORBITT TRUCK REORGANIZED

HENDERSON, N. C., Dec. 22—The Corbitt Motor Truck Co., this city, has bought out the Corbitt Automobile Co., also of this city. It has incorporated

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for $1,000,000 under the name of the Corbitt Motor Truck Co. This company started manufacturing motor cars 7 years ago, but after 3 years commenced the manufacture of trucks, and as it has discontinued the manufacture of passenger cars altogether it was thought best to change the name.

FEDERAL TO ENLARGE

DETROIT, Dec. 20—While the manufacturing facilities of the Federal Motor Truck Co., this city, have been doubled during the past year, plans are already under way to construct another large assembling plant that production may be further increased during 1917.

SELDEN EXPANDING DISTRIBUTION

ROCHESTER, N. Y., Dec. 28—The new policy of the Selden Truck Sales Co. of actively pushing its dealer and advertising campaigns is now beginning to show results. One of these is the establishment of a Pacific coast department at San Francisco.

At a meeting of directors held here today the semi-annual dividend of 6½ per cent on the preferred was declared.

REO WORKING FORCE IS 5000

LANSING, MICH., Dec. 27—The Reo Motor Car Co. working force now numbers 5000, 1500 more men being employed than in the summer of 1915. The company is shipping 100 cars a day on flat cars because of freight congestion.

DUPLEX ACQUIRES PLANT SITE

DETROIT, Dec. 21—The Duplex Motor Truck Co., of Lansing, has purchased 15 acres of land, on which work will immediately begin for the construction of a plant, 60 ft. by 800 ft. The plans are for a daily production of ten trucks. The new factory will employ 250 men. More than $50,000 worth of new machinery has been ordered, which will be used to enlarge the plant that is to be moved from Charlotte.

COLUMBIA INCREASES CAPITAL

PONTIAC, MICH., Dec. 19—The Columbia Motor Truck & Trailer Co., Pontiac, Mich., has increased its capital from $35,000 to $100,000. The additional stock was subscribed for by several private individuals. The company plans to erect another additional building.

FOUR WHEEL TAKES OVER UTILITY

CLINTONVILLE, WIS., Dec. 11 — The Four Wheel Tractor Co. has taken over the Utility Steel Tractor Co., Antigo, Wis., and will market the Utility tractor with improvements. David S. Stewart, who invented the Utility tractor, has opened an electric theatre in Appleton, Wis.

RECEIVER FOR DURABLE DAYTON

DAYTON, OHIO, Dec. 16—Upon the application of R. T. Johnson the Court of Common Pleas has named H. C. Harmon receiver for the Durable Dayton Truck Co., manufacturer of motor trucks. The complainant avers that he is surety on a note for $5,000, and there are no available assets back of it. The concern will continue to be operated by the receiver.

Greatly Increased N. Y. Truck Fees

"Unconstitutional", Says Governor of Unfair Taxation

NEW YORK CITY, Dec. 30—*Special Telegram*—Motor truck fees in New York state will be increased from double to fourteen times the present charges if the schedule of the special Truck Fee Commission filed with the secretary of state to-day, is favorably acted upon by the legislature. The fee for buses is based on seating capacity alone and that for trucks on combined weight of vehicle and load. Vehicles having a combined weight of 2 tons will have to pay $10. Seven-ton trucks, weighing about 14 tons with body and load, will have to pay $70. The governor has admitted that the delegation of taxation powers to a commission is unconstitutional and so the recommendations will be submitted to the legislature for ratification and possible modification. Complete details will be published in a subsequent issue of THE COMMERCIAL VEHICLE.

LANGERBACHER WITH DUPLEX

DETROIT, Dec. 21—Andrew Langerbacher has become sales manager of the Duplex Truck Co., of Lansing. Mr. Langerbacher was formerly with the sales organization of the Reo Motor Car Co.

COVERT RETIRES FROM GEAR CO.

DETROIT, Dec. 19—B. W. Covert, president of the Covert Gear Co., Buffalo, N. Y., will retire from the company on January 1, having disposed of his common stock. Control will pass to P. A. Clum, of Rochester, N. Y., and F. E. Mosher, of Buffalo.

TROY TRAILER SALES CO.

TROY, OHIO, Dec. 20—The Troy Trailer Sales Co. has been incorporated under the laws of Ohio by C. A. Geiger, C. N. Peters, G. R. Harris, R. C. Sykes and H. H. Tamplin. The Troy Wagon Works Co. will henceforth market its trailers under the name of the Troy Trailer Sales Co.

UNITED MOTORS CO. RAISES CAPITAL

DETROIT, Dec. 18—The United Motors Co., Grand Rapids, Mich., has increased its capital from $100,000 to $750,000. The increase has been paid in in cash by the incorporators, and officials of the company state that the concern is in excellent financial standing, with no bonded or floating debts. Officers of the company recently elected are: Frank D. Hulswit, president; George P. Sweet, vice-president; H. R. Green, treasurer; L. H. Einke, secretary, and K. A. Myers, assistant treasurer.

A. O. SMITH RAISES WAGES

MILWAUKEE, Dec. 13—The A. O. Smith Co., this city, has announced a 10 per cent increase in wages for all employees drawing less than $125 per month, effective December 1. This affects approximately 1,400 men.

11 TRUCKS AT PORTLAND SHOW

PORTLAND, ORE., Dec. 18 — Eleven makes of truck are to be exhibited at the Eighth Annual Automobile Show of Portland, to be held under the auspices of the Dealers' Motor Car Assn. of Oregon at the Armory, Portland, January 27 to February 3.

The trucks to be exhibited are the Garford, G. M. C., Indiana, Kisselkar, Moreland, Reo, Republic, Sterling, Stewart, Studebaker and White. In addition to these the Smith Form-A-Truck will be exhibited.

NEWARK TO SHOW TRUCKS

NEWARK, N. J., Dec. 30—Commercial vehicles are to have a place in the Newark show, as previously. The show will be held at the First Regiment Armory, February 17 to 24. Space is now being allotted and there is time for many more truck builders to secure allotments. January 25 has been set as the last date at which applications for space will be received.

NEW BOSCH TRUCK CONTRACTS

NEW YORK CITY, Dec. 28—Three new contracts with truck companies have been made by the Bosch Magneto Co., these being with the United States Motor Truck Co., Covington, Ky., the O. Armleder Co., Cincinnati, O., and the Krebs Commercial Car Co., Clyde, O.

EARLE & BOGGS REPRESENT BUDA

NEW YORK CITY, Dec. 26—Earle & Boggs, this city, manufacturers' representatives, have been appointed representatives of the Buda Co. in the East. The Buda company makes motors for cars, trucks and tractors.

ARMY TESTS CATERPILLARS

MARFA, TEX., Dec. 18—The initial test run of the military tractor train recently received here from Peoria, Ill., for use in the Big Bend region of the upper Rio Grande border, has just been finished. The run was made over a rough stretch of country, and is said to have come up to the army requirements in every way. The test was conducted under the direction of Capt. H. A. Hegeman, quartermaster in charge of the motor truck shops at Fort Sam Houston.

The run was made between Marfa and Presidio, a distance of 63 miles, over a desert, rough region where water is scarce. The equipment consisted of a 75-hp. caterpillar tractor and four trailers, each equipped with caterpillar tread instead of wheels. Each trailer had a cargo-carrying capacity of 15 tons.

The trip was made at an average speed of about 2½ m.p.h. over a road that is a road in name only. The train was loaded to full capacity with supplies on its outgoing trip. Captain Hegeman will make a complete report on the trial trip to Col. H. L. Rogers, chief quartermaster of the Southern Department, with headquarters at Fort Sam Houston.

LONGEST U. S. ARMY TRUCK RUN

FORT SILL, OKLA., Dec. 16—The longest motor truck trip ever made by a motor truck train in the regular army was made by a fleet of Packards under the command of Capt. O. L. Brunzell from El Paso, Tex. It was 1,195 miles, and the train took 18 days 8 hours to make it. Only 8 days 17 minutes were consumed in actual running time, however, for washouts, floods and weak bridges caused many tedious delays and detours.

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Motor Trucking Centers of America—IV

PHILADELPHIA AND BALTIMORE

Quaker City One of Short Hauls—Taxation Hinders Greater Truck Development in Baltimore

PHILADELPHIA, PA., Dec. 18—Philadelphia's trucks have increased 33 per cent in number during the past year, thereby disproving the proverbial stigma that Philadelphians are apathetic towards speed, insofar as the use of motor trucks is concerned. The year 1916 has been the greatest truck year in the history of the city. Philadelphia and its suburbs within the corporate limits of the city now boast of 8,500 trucks as compared with approximately 6,500 commercial vehicles a year ago, a gain of about 2,200.

This large increase in truck use has been due to a combination of causes attributable to better business conditions generally as induced by the war trade and its stimulation of the textile, munition, shoe and allied industries.

Contractors Large Purchasers

A fair percentage of the 33 per cent increase can be traced to large purchases of trucks by department stores, coal dealers, contractors and the daily newspapers. Many of Philadelphia's department stores and coal dealers have held off buying trucks until certain of the larger concerns in their respective fields had carried out complete experimental work with trucks and established some standards of application, operation and maintenance. This has been accomplished. As a result, many such concerns purchased large numbers of trucks during the year.

Field for Many More Trucks

Philadelphia offers particularly good inducements for motor truck use notwithstanding its handicap of narrow and poorly-paved streets in some areas and one-way traffic in other sections. The present total of 8,500 trucks is but a starter as compared with the number required to saturate the city market.

At the present time there are approximately 58,000 horses in service within the city limits. To replace these animals would require from 10,000 to 15,000 commercial vehicles. In addition to this number, several thousand vehicles would probably be required to serve the increased population of the city each year.

Geographically, Philadelphia may be called the Diamond City. The zone in which the great majority of trucking is done is roughly a huge diamond, 20 miles in length and 10 miles in width. At the center is the City Hall, the heart of the city. Broad street runs from end to end of the diamond, intersecting Market street at the City Hall. Both Broad and Market streets are wide thoroughfares which are the great outlets to all points of the diamond.

Transportation in the diamond zone is still further determined by the fact that two sides of the diamond are bounded by rivers, the Delaware and the Schuylkill. Within this area there are approximately 76 well-scattered railroad freight stations. This makes the city one of short hauls for the great majority of transportation work, although of course some of the department stores and similar houses use their trucks to make deliveries in the outlying suburbs beyond the city limits. The short-haul problem makes Philadelphia a city of large rather than small trucks, for the reason that on the short hauls the small vehicles do not make such good advantage of their speed as they do on the longer trips.

Solid-Tired Trucks Predominate

For this reason about 70 per cent of the trucks, or 6,000, are mounted on solid tires and the remainder on pneumatics.

This comparative percentage of solid-tired vehicles to those with pneumatics is larger than that found to exist in other cities where the number of pneumatic-tired vehicles is generally equal to or greater than that for the solid-tired trucks. This condition has been due to the apparent dislike of Philadelphia's small merchants to displace horses by motors prior to this year.

The small and speedy pneumatic-tired delivery vehicle has made great strides during 1916, and it is expected that the number of such vehicles in use at the end of 1917 will be in excess of the solid-tired type.

This increase has been due to the principle of industrial imitation.

Philadelphia department stores have been most conspicuous in this respect, although John Wanamaker's Philadelphia store has used some sort of commercial vehicle for 5 or 6 years.

Most of the smaller department stores have waited for the large stores to standardize on delivery equipment before purchasing their own. They have let whoever would experiment do the pioneering work, preferring to hold back in the purchase of their own equipment until the results of others' work over a sufficiently long period could be obtained and in this way endeavor to reap the fruits of the large stores' experience.

As a result, the development of the motor delivery equipments of the smaller department stores was held back until this year, when practically all purchased trucks. Many of the stores now have almost exclusive motor equipment, and it is expected that the few horses which remain in the work will be eliminated before the end of 1917 except for those used in the freight haulage service.

Aside from the large increase in the use of trucks for department store and small store delivery work, those purchased during the past year by contractors, coal dealers and newspapers have played a prominent part in the 33 per cent increase.

The increased use of trucks by contractors has been caused by the subway construction work, which started in the early spring of 1916. Contractors evidently realized the great savings which could be effected by trucks in that work as compared with horse wagons, for they purchased a large number of trucks, one man purchasing fifty 5-tonners. These trucks, all Whites, were bought by Stedman Bent, who now has a standardized fleet of sixty-one vehicles, as published in the October 15, 1916, issue of THE COMMERCIAL VEHICLE.

Although a large number of these trucks are engaged in haulage connected with the present subway work, many are hired out to other contractors, merchants or manufacturers for haulage by

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the day, week or month or by the yard or ton. The two large contracting concerns headed by Edward Vare and James P. McNichol, which have the greater share of the subway contracts, are also large users of trucks.

Coal Dealers Buy Trucks

Coal dealers have purchased a large number of trucks during the past year, so that at the present time there is hardly one of the larger dealers who has not one or more commercial vehicles in service. Coal merchants, like the department stores, held off buying trucks until the larger companies had proved them a success. Owen Letter's Sons were among the first to make extensive tests of trucks for the delivery of coal in the Philadelphia territory, as pointed out in the February 15, 1915, issue of THE COMMERCIAL VEHICLE.

Coal Hauls Short

The coal trucks in use in the Quaker City differ from those in use in New York or Chicago in that the great majority are of from 2 to 3 tons capacity instead of from 5 to 6 tons burden. The reason for this is that Philadelphia is a city of many railroad sidings and many coal companies, so that the delivery radii of each is comparatively small. Camden, N. J., across the Delaware river from Philadelphia, is also supplied with coal by a network of railroads with sidings at convenient points, so that little of the coal brought to Philadelphia is sold in Camden. Furthermore, many of the Philadelphia streets are mere alleyways in which trucks larger than from 2 to 3 tons capacity cannot turn around.

Many of the manufacturing plants located within the city limits are old buildings with platform scales designed for horse-wagon days, and whose capacity is not more than 5 tons, including the weight of the vehicle and load. The small-capacity trucks used for the great bulk of the city delivery work are also employed for deliveries in the outlying suburban territory, making up for what they lack in capacity, as compared with larger units, by a greater speed. It has been the experience of the Owen Letter's Sons company that it can deliver the average amount of coal purchased by the average individual for home consumption more cheaply by 2-ton trucks than with larger units, provided the deliveries are made within a 10-mile radius from its plant. This is due to the fact that the average home consumption is about 15 tons a year, and that the small 2-ton truck can deliver this amount in the congested Philadelphia territory in the same time as a larger vehicle due to the former's greater speed and at a lesser cost due to its lower maintenance charges.

All three of the large afternoon newspapers now use motor trucks, one of them, the *Telegraph*, having purchased twenty-eight Garford trucks in 1916 and eliminated all of its horses. Another, the *Bulletin*, uses trucks with small four-wheeled trailers, the latter being left at one of the distributing stations on each out trip and picked up empty on the return run. The newsboys come to the distributing station at which the trailer is left and by the time the truck has returned from the more distant station the trailer has been emptied. Most of the morning newspapers do not employ trucks at the present time because the great majority of the early editions are distributed by the Central News Co., a separate organization.

While most of the trucks used in the newspaper delivery are pneumatic tired, because the element of speed is essential, those in the coal trade and contracting business are shod with solids. A further reason for more than half of the city's trucks being equipped with solid tires is that Philadelphia has the greatest diversity of industrial plants of any city in the world, and produces within the city limits approximately $1,000,000,000 worth of manufactured articles yearly, or one twenty-fifth of all the goods manufactured in the United States.

Philadelphia Great Manufacturing City

Before the war Philadelphia was the first city of the United States in the building of ships, locomotives and street railway cars, and in the production of carpets, leather goods, hats, woolen goods and numerous other manufactured products. Since the war began, it has increased its output in many of these articles and has added the making of arms, munitions and the various appliances of war. Within the corporate limits are the great establishments of the Midvale Steel Co., the Baldwin locomotive works, the Cramp shipyard, the Stetson hat works and the Brill car plant. The New York Shipbuilding Co., the Victor Talking Machine Co. and the Remington Arms Co. are all located in the metropolitan district of Philadelphia.

City Has Many Freight Stations

Philadelphia is also the greatest textile manufacturing city in the world. It has more than 10,000 manufacturing plants and seventy-six railroad freight stations situated within the city confines. While many of the factories have railroad sidings, a great majority use one or more of the many freight stations for both incoming and outgoing goods and employ heavy trucks in the service. Due to the large number of freight stations, each serving one particular manufacturing area, the delays encountered by trucks in getting or depositing goods are not as serious as those in other cities with a smaller number of stations or as met with at Philadelphia's docks, at which the congestion rivals that at either New York or Boston.

Aside from the manufactured goods hauled by trucks to the railroad freight stations, considerable is hauled direct to the distributors in the city itself. There is also considerable motor truck haulage between the various manufacturing plants or the different factories of the same concern. In this work the trucks render a much quicker service than could be had by any other means.

One of the best examples of this work is that of the Baldwin Locomotive Co., which is using twelve 5-ton trucks to haul partly-finished and finished products between its Philadelphia plant and that in Eddystone, about 12 miles distant. These trucks work day and night and carry full loads in both directions.

Dock Conditions Poor

Although Philadelphia is one of the first-class ports of the Atlantic seaboard, handling a total foreign and domestic tonnage of 18,693,058 during 1915, her docks are antiquated and the methods in use so slow that motor trucks cannot be made profitable in the work because of the excessive delays to which they are put in getting goods out of or onto the piers. Besides, some of the docks do not permit gasoline trucks on them due to the necessity of having to pay a higher fire insurance premium.

Philadelphia motor trucks are also handicapped by the poor ferry service between the city and Camden, across the Delaware river. There is only one bridge joining the two cities, and this is a railroad structure with no provision for vehicular traffic. At the present time there are four ferries in service, and although these have new large boats placed in service during the past year, many delays are caused by fogs and storms. Before the new boats were installed the ferries were the laughing stock of the city in so far as trucks were concerned, because the bridges of the ferryboats were so low that it was necessary to load trucks with large bodies, like moving vans, on the rear deck and then turn the boat around to allow them to back off on the other end of the route. A vehicular bridge across the Delaware would aid greatly in increasing the development of motor trucking between the two cities.

Philadelphia Short-Haul City

Although Philadelphia's trucks have increased greatly in the past year there is still a large field for their use because 58,000 horses were in commercial work within the city limits on April 21, 1916, according to figures of the city statistician. The reason for this large number in horses is that Philadelphia is a flat or level city of short hauls. It has an area of 129.5 square miles, covering the county of Philadelphia, which takes in the important residential suburbs. The main portion of the city is included within the Delaware and Schuylkill rivers. Parallel with the Delaware, the greatest length is approximately 20 miles, and at right angles 10 miles. That portion of the city along the upper Delaware is not as thickly settled as the rest, so that the main business area of the city may be included in an area 10 miles square. This means relatively short hauls.

Short hauls, however, do not of necessity mean that motor trucks cannot be successfully used. This is very well proven by the installation of the electric trucks owned by the Curtis Publishing Co. As described in THE COMMERCIAL VEHICLE of October 1, 1914, the trucks of the Curtis company have reduced the cost of haulage of the concern's goods 12 cents per ton as compared with horses, notwithstanding the fact that all of the trucks which made the saving possible work on runs in the most congested part of the city, none of

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which are more than 1.1 miles long. This saving has been secured by keeping the trucks in actual motion the greatest possible time each day. This in turn has been secured by the use of mechanical loading means and by demountable bodies loaded while the truck is delivering one load. On its return the empty body is lifted off the chassis by means of mechanical hoists and the loaded one deposited in its place in 5 to 6 minutes. The efficiency of these trucks hauling periodicals has been further increased by the installation of similar body hoists at the Broad street station of the Pennsylvania railroad by special arrangement with the latter. By this method the truck is able to make its round trip in 35 minutes, whereas previously it took from 15 to 40 minutes to load or unload.

Although the Curtis trucks work in the downtown section of the city, where many of the streets are narrow, the main arteries out of the city like north and south Broad street and Market street are wide and well paved. In fact, the great majority of the city's 1,655 miles of streets are well surfaced and kept in fair condition. The miles of the different kinds of pavement as laid on December 31, 1915, are as follows:

Business Section of the City	Miles
Granite block	343.64
Asphalt, sheet	548.33
Asphalt, block	7.27
Vitrified block	182.29
Wood block	16.06
Cobblestone	5.69
Rubble	4.17
Slag block	8.13
Cement and granolithic	11.03
Total	1,126.61
Undeveloped Section of City.	
Concrete	2 52
Bituminous pavement	91.79
Waterbound macadam	246.02
Granite block on hillsides	.35
Total	340.68
Earth roads	188.45
Grand total	1,655.74

With Philadelphia's present estimated population of 1,709,518, the relation between her 8,500 commercial vehicles and the number of inhabitants gives one truck for every 201 persons. In this respect she is ahead of New York with one truck to every 400 inhabitants and behind Boston, Mass., with 171; Springfield, Mass., with 157, and Bridgeport, Conn., with 150.

Baltimore Taxed Out of Right Place as Truck Center

Bad Streets Also a Detriment

BALTIMORE, MD., Dec. 19—Municipal Baltimore and the State of Maryland are doing their best to legislate motor trucks out of the city rather than extending them the glad hand and welcoming them as the heralds of better transportation and better street pavements. Three different taxation conditions exist as follows:

1—Solid-tired motor trucks used in the city of Baltimore must pay three taxes, namely:

a—A city tax of $3.

b—A state tax of $8 for the first ton of capacity and $6 for each additional ton.

c—A personal property tax which is equivalent to about 2 per cent of the assessed valuation.

2—If you are in the bus business and operate solid-tired trucks over fixed routes which pass over city streets, you must pay two taxes, namely:

a—A city tax of $3.

b—A special state tax based on the seating capacity and mileage and the weight of the vehicle.

3—If you operate a public freight line of solid-tired motor trucks over certain fixed routes any of which pass into Baltimore, you must pay two taxes as follows:

a—A city tax of $3.

b—A special state tax based on ton-miles multiplied by the number of miles run.

This burden of double and triple taxation is apparent when each case is considered in a concrete example.

Even the taxes for trucks not engaged in the transportation of passengers or freight over fixed routes for hire are unusually high.

In the first case pneumatic-tired vehicles are charged 50 cents per horsepower with a minimum of $5. Solid-tired trucks are taxed $8 per year for the first ton of carrying capacity and $6 for each additional ton. This makes the tax for a 7-ton truck $44, exclusive of a $3 city tax and a personal property tax of about 2 per cent of the truck value.

In the case of buses, the law reads that the tax shall vary from 1/20 cent per each passenger-seat for vehicles weighing less than 3,000 pounds, multiplied by the number of miles to be covered during the period of the license, to 1/14 cent for vehicles weighing over 7,000 pounds. Thus a bus mounted on a 5-ton chassis with a body accommodating thirty passengers and operated 40 miles per day for a 300-day year would have to pay 30 × 1/14 × 12,000, or $257.14, plus $3 for having solid tires, exclusive of the property tax.

What Freighters Pay

Trucks used in the public transportation of freight or merchandise must pay a state tax based at so much per ton-mile, multiplied by the number of miles it is calculated the vehicle will cover in a year or the period of time for which the license is to run. The rate per ton-mile varies from 1/12 cent for trucks weighing 3 tons or less, including load, to ⅛ cent for trucks weighing over 6 tons, including the load. The maximum size of truck allowed on the roads is a 7-tonner.

Under the law, a 7-ton truck making a round trip each day of 40 miles with a full load in each direction would make a total of 280 ton-miles, which at ⅛ cent each would make the daily tax 35 cents. For a 300-day year this would amount to $105. If the truck ran into Baltimore it would have to pay a $3 city tax, making a total year tax of $108, exclusive of the personal property tax.

These taxes went into effect July 1, 1916.

They have forced many of the bus companies to give up the ghost, while those that remain have been forced to charge higher fares to remain in the field. In the case of the public freight trucks, many lines which could not secure fairly uniform business the year round have been forced to discontinue and those which have remained have passed the tax on efficient haulage methods along to the final consumer.

Trucks Essential to Baltimore

To gain the proper perspective on the reasons for the latter taxes, one must first picture Baltimore, a city of 579,590 souls, located at the head of Chesapeake bay, and surrounded by a fertile farming country and many thriving industrial centers which are not properly served by railroads or trolley lines. Baltimore ranks first among the cities of the United States in the canning and preserving industry and is a great food center to which come fruit, vegetables, dairy products, poultry, and meat produced in the fertile valleys and along the shores of the Chesapeake.

While Baltimore ranks second among American ports for the export of grain, the railroads from the south, west and north do not render a proper service in the short-haul territory within the vicinity of the city. This lack of railroad service is not eliminated to any great extent by the trolley lines which radiate from Baltimore as a center and reach the thriving neighboring towns. For this reason it has been exceedingly difficult for the population of such towns to reach Baltimore or to ship to or get goods from it.

These conditions made possible the rapid growth of the motor bus in the early part of 1915 and an increased number of motor truck freight lines running between Baltimore and many of the outlying districts. In fact, the buses and motor truck freight lines gave such far better service than the railroads and trolley lines that Baltimore became a veritable hotbed of jitneys and more pretentious bus lines. Many overland freight lines sprang up almost overnight. The success of motor vehicles in both of these lines of work was so phenomenal that they secured practically all of the passenger and freight transportation between Baltimore and its surrounding territory.

When it was found that the Baltimoreans were quick to take advantage of the vastly superior service offered by the motors as compared with the railroads and trolleys, these traction interests began agitation for the taxation of such vehicles. This has resulted in the present unfair and discriminatory taxes which are now found upon Maryland's statute books. They are discriminatory because horse vehicles engaged in some of the short-haul work are not taxed and unfair because the taxes are excessively high and designed to throttle the development of the motor truck.

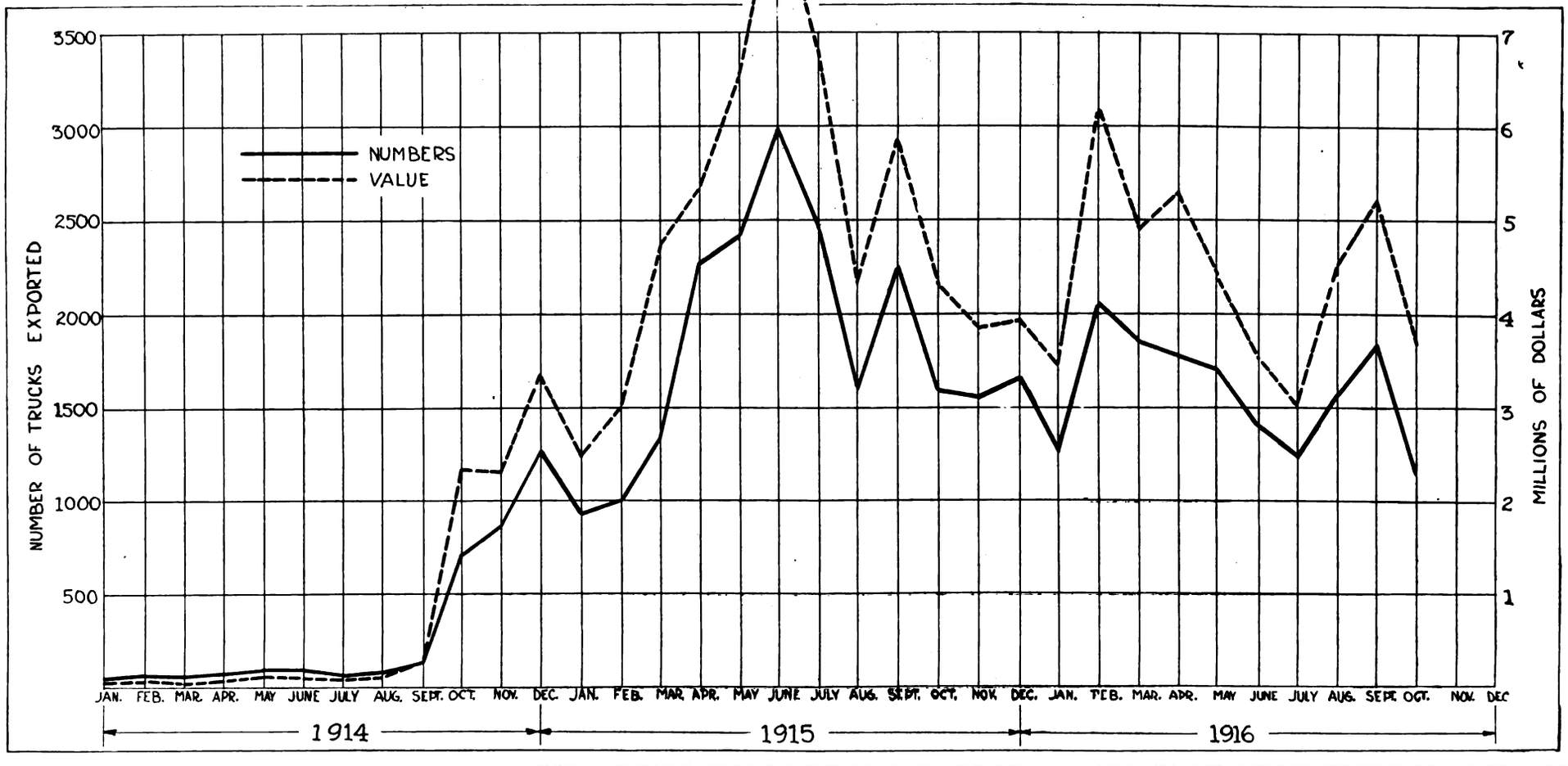
The Mischievous Result

The unfair taxes have retarded the growth of motor trucks not alone in Maryland, but also to a greater extent in Baltimore, for approximately one-half of the state's 6,000 commercial vehicles are registered in the city.

(*Continued on page* 50.)

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Truck Exports Drop 42% from High-water Mark, June, 1915



EXPORTS of motor trucks at the present time are only about 42 per cent of what they were at the high-water mark reached in June, 1915. In that month almost 3,000 trucks, valued at more than $8,500,000 were shipped abroad. Since that time they have steadily decreased in both number and value with but five exceptions. In each of these 5 months the vehicles exported exceeded those of the months immediately preceding.

The war has been responsible for the great increase in our motor truck exports. This is strikingly shown in the above table in which the heavy black line shows the variations in the number exported from month to month and the dotted line the monetary value.

In the 7 months preceding the declaration of hostil-ities on August 1, 1914, the average number of trucks exported per month was sixty-five. Then the governments of France, England and Russia, realizing their inability to produce trucks fast enough to take care of their tremendous military transportation needs, sent representatives to this country on the fastest steamers to buy what was available on our market.

In September, 1914, the number of trucks exported was double the average number shipped in the 8 preceding months. Then as our factories were enlarged and put under high working pressure to fill the orders placed, the exports increased in leaps and bounds to the high-water mark in June, 1915. This increase was steady with the exception of but 2 months when sufficient shipping bottoms could not be secured.

The trucks shipped abroad up to the high-water mark were used almost exclusively for war purposes. Since that time, an increasing proportion of the exported vehicles have gone into commercial service in the warring nations to replace those private vehicles commandeered during the first stages of the war.

In all 41,441 trucks, valued at $112,865,887 were exported during 1914, 1915 and 10 months of 1916. Although the high-water mark was reached in June, 1915, the exports of the other months of that year were so much smaller that the 1916 exports will be approximately 92 per cent of those of 1915 in value and 90 per cent in number if the average rate of the 10 months of 1916 is maintained. The average value per truck exported during the entire period was $2,720.

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Education, The Best Cure For Overloading

Editorial Initiates Countrywide Symposium

WANTED—A panacea for overloading troubles. That the facility with which users can fit oversized tires to their trucks is the cause of much overloading was stated in an editorial published in this magazine last May. A sufferer from this very practice—the Sheldon Axle & Spring Co., Wilkes-Barre, Pa., immediately undertook to spread the gospel as preached in that editorial. Every important manufacturer of motor trucks or motor truck components has been interviewed by letter on this subject and through the tireless efforts of F. L. Martin, sales manager of the Sheldon company, the industry has become thoroughly aroused over the question.

Overloading is without question the greatest abuse to which motor trucks are subjected. At practically every meeting at which the broader problems of the business have been discussed, both from the user's and the trade's angle, overloading has been the chief topic.

Education, not alone of the user, but of certain portions of the industry as well, seems to be the cure which it is most generally believed, will eradicate the evil.

Unquestionably something will be done to keep the commercial vehicle world awake to the importance of combatting the overloading abuse and a decision as to what means shall be taken will no doubt follow the receipt of replies to Mr. Martin's latest series of letters, covering all interests in the trade.

How It All Started

The editorial which initiated the campaign was published in the May 1, 1916, issue of THE COMMERCIAL VEHICLE and reprinted in the issue of July 15, at which time the commencement of the campaign was announced.

Since that time, Mr. Martin has pushed his work with fervor and by November 18, when he made a final canvass of all sorts of makers of parts and vehicles, replies have been received from eighty-three companies, two-thirds of whom were truck makers. In this last appeal for co-operation, Mr. Martin summed up the matter as follows:

Martin Puts the Question

"The May 1 issue of THE COMMERCIAL VEHICLE *contained an editorial entitled 'Tires—The Key to Overloading,' which was of such striking force that we had it copied and sent it to every truck maker and every parts maker in America whose address we had, together with a letter asking for comments and suggestions.*

"We had suffered considerably from this evil ourselves and knew it was a serious matter to the various truck and parts makers, but how serious we had no appreciation until the replies began to pour in.

"The matter seemed important enough to us that we had all those letters which offered any worth-while suggestions copied, and are sending you herewith a complete set of these copies, together with a copy of the editorial in question, so that you can see for yourselves what the various makers' thoughts are in this direction. You will note by reading these letters that the majority of the makers of both trucks and parts feel that something should be done and are willing to do their share, provided a satisfactory course of action can be decided on. We don't want to make any further suggestions until you have had an opportunity to read over the various opinions given herewith, and trust you will go into the matter in detail at your early convenience and let us know what your thoughts are. We believe it will be possible to decide on some course of action suitable to all, possibly such as the one suggested by Mr. Howe, of the International Harvester Co. of hiring a good writer to cover the subject. Possibly the trade papers would be willing to give us considerable space and we could also, if necessary, buy space as required.

"Another side to the question develops, as the tire people claim the only reason they sell over-size tires is in self-protection, that the truck dealer and truck salesman are really at fault in that they make extravagant claims as to the capacity and ability of their trucks, and consequently the fault lies primarily with the truck manufacturer or his agents.

"Evidently this is not a matter to be adjusted at long range. Shall we have a get together meeting of the truck makers, parts makers and tire makers, or shall we leave out the tire makers?

"Possibly the automobile trade papers should take hold of the matter and handle it from now on. At any rate, won't you tell us what you think? We await your reply with interest."—F. L. MARTIN, *sales manager, motor vehicle axle department, Sheldon Axle & Spring Co., Wilkes-Barre, Pa.*

With his letter of November 18, Mr. Martin sent copies or abstracts of the full series of replies to his original inquiry.

These replies introduced seven dominant ideas, and a total of thirty-two distinct comments of special pertinence to the subject.

Education, conducted in some form of organized campaign, through the business press received the greatest amount of endorsement of any of the proposals advanced, nineteen writers urging such a plan as the one most likely to produce results. As an alternative to this, four advocated the pushing of the propaganda through co-operative advertising. One man suggested that a competent writer be employed to prepare a series of articles on the subject, to be supplied to appropriate magazines or papers for gratis publication.

Sixteen Ready to Act

Sixteen companies pledged themselves to assist in any campaign of education which might be undertaken. Only one correspondent advocated a convention of manufacturers to standardize practice in regard to overloading, although each was entering into the get-together spirit in contributing to the preliminary discussion. Another suggested that all manufacturers enter into a gentlemen's agreement, however, not to do anything which would encourage overloading.

There were two suggestions that an axle manufacturers' association be formed to safeguard the axle manufacturers' interests by taking steps to combat the overloading evil.

Six decried the guaranteed overload policy of a few makers as one of the greatest causes of the evil and nine urged that manufacturers regularly rescind the guarantees on their trucks when cases of overloading were manifested. One wanted the N. A. C. C. warranty revised to include a clause making it contingent upon respect for the rated load capacity of the vehicle. Another would have axle manufacturers affix a caution plate on the dash of each truck calling the driver's attention to the maximum permissible load which the axle

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Springs the Tell-tale

"We have underrated our trucks of all models and in all cases, and then in working out each model we have made the rear springs the weakest part of the truck. All of our rear springs are right to carry the maximum body and payload that should be put on any of our models, and we have tried to have our springs made so that when this maximum load was on the truck that the rear springs would just nicely carry that weight and then if the party using the truck should put on more than the maximum weight the rear springs would go down so that the bottom of body would strike the rubber tires on the rear wheels, providing the body extended out over the rear wheels, which is usually the case on the larger trucks, which are the ones that are in the most danger of being overloaded."—L. W. NICHOLS, secretary and sales manager, Gary Motor Truck Co., Gary, Ind.

Installation Engineering Needed

"My own views as a designer are that it is impossible to give a rating to a truck until the conditions under which it operates are known. This makes selling trucks an engineering problem. A 2-ton truck may carry 3 tons regularly and profitably for one man and fail under a 2-ton load for another. It may be racked and strained worse under a 1-ton load on rough roads than carrying 3 tons on smooth ones. No formula can take the place of brains and judgment on the parts of agent and buyer.

"The average salesman will try to sell what he has, regardless of what the buyer needs, and very few purchasers have the technical and practical knowledge necessary to properly select the right size truck for their work. The advantage temporarily lies with the salesman, who says: 'The truck is rated at 2 tons, but we have had 5 tons on it. It will carry 3 tons like a top. It will do your work.' The price is less than a 3-ton truck and the salesman gets the order. Sometimes that may go and the transaction be economically correct and benefiting to both sides. This is one of the cases where oversize tires should be sold. Under other conditions the salesman might be selling his company from $500 to $1,000 worth of bad advertising and cutting himself out of other sales which he might have gotten by passing up the one for which his truck was unsuited. I should say the remedy is education.

"Trucks should be rated at their most economical performance under normal conditions for which they are designed and these conditions should be made perfectly plain and clear in the sales literature. A truck designed for city streets and pneumatic tires is a considerably different piece of design from the one of the same rating designed for solid tires and rough roads. The use of either of these trucks under conditions different from those for which it was designed will alter its economy. Bad roads, overloading, overspeeding, have to be paid for by the owner. Underloading also costs money. He should be informed on these points, but he wants something definite, and the trouble is we do not know these things definitely ourselves. Not knowing, we cannot say that this truck carrying this rated load will cost you so much per ton-mile for tires, so much for gasoline, so much for oil, so much for repairs, and so much for depreciation. With 50 per cent overload these items become so and so, with half load so and so. Your overhead and constant expense is so much. You have so many ton-miles per day to handle, and your units are so heavy. About so many trips per 100 will be overloaded about so many per cent and the extra cost per ton-mile on these trips so much. The next size larger truck gives such and such costs and the next size smaller truck will cost so much for these items, you need a truck of so much capacity. The customer would realize then that both overloading and underloading cost money.

"An educational campaign carried on by forceful articles published in trade journals read by users of trucks would be of great educational value, for if we can get the purchaser alive to the economic elements of truck use, the unscrupulous salesman will not be able to do so much damage. These articles should not be written in 'Baby musn't' style, but should treat overloading as a business proposition, the same as paying double time for Sunday work, necessary in emergencies, but expensive. Go after the idea that overloading gets something for nothing. Overspeeding comes under the same line of argument. If I owned a truck I should certainly overspeed, if necessary to catch a certain train, but I should know that it was costing me extra money.

"This same line of articles should bring out the necessity of keeping the truck moving. This feature has been emphasized in automobile trade journals, but I do not think the trade papers of the various lines of business have been properly cultivated in this regard. In fact, a series of well-written articles in these papers would have a general advertising value for commercial cars considerably greater than those in the regular advertising pages, and would have the advantage of costing nothing but that necessary to pay the author."—F. D. HOWE, superintendent of experiments, International Harvester Corp., Akron, O.

Business Methods at Fault

"Based on 4 years' selling experience of motor trucks exclusively, I believe that the evil is largely due to those who are actually placing the business and is the result of the desperate desire of the so-called factory sales manager to land dealers.

"Of course, if the sales manager has a board of directors back of him who can only judge of his worth and ability by the actual number of dealers appointed, you can hardly blame him for his methods.

"I do not look to the tire people for much assistance in curbing the overload evil, and think that the reputable builders and parts people must continue to preach the gospel of safe and sane operation. The right kind of a dealer will not allow his salesmen to encourage the practice of overloading and the right kind of a factory sales manager will not appoint any dealer who is likely to indulge in extravagant sales statement and methods.

"I do not think that in the design of motor trucks, the factor of safety should be cut; leave it as it is; it is often needed to cope with conditions, but I do think we should have a house cleaning of the misrepresenting salesmen, dealers and manufacturers. The latter class are often responsible for the practice and the writer, from long experience, knows of quite a number of the largest ones looked up to in the industry who are as responsible for the trouble as any.

"One trouble is the fact that there is no measure by which trucks of different sizes or capacities may be properly judged.

"The matter, to my mind, is one of selling, honest, intelligent selling, and combined co-operation between the builders and parts people toward further education and standardization.—CHARLES E. STONE, sales manager, J. C. Wilson Co., Detroit.

Would Attend a Convention

"You may be sure that the writer will be glad to co-operate with you and will even go as far as to attend any conference that you might call in order to get the thing before the truck sales managers of the entire country, and further than that, I believe that we could start a campaign of publicity that might start the ball rolling."—WILLIAM L. BURGESS, manager of sales, Dorris Motor Car Co., St. Louis.

Preserve Safety Factor

"It is absolutely necessary to build large factors of safety into such parts as axles, frames, transmission gears, etc.

"The truck must be capable of carrying its normal capacity up grades and through heavy roads. Therefore, it is impossible to limit overloading by the motor size, or by the clutch. The axle, also, cannot afford to be too near the danger point. It would see then that in the springs and tires lie the only points wherein the overloading can automatically be limited.

"The truck manufacturers should co-operate and take measures, such as voiding all guarantees, where habitual overloading is found, but by all means the use of oversize tires and extra heavy springs should be avoided.—LEWIS P. KALB, engineer, Kelly-Springfield Motor Truck Co., Springfield, O.

Experience Shows Folly

"It is our experience here in Chicago that the majority of motor truck fleet owners have learned the folly of overloading, overspeeding, etc. We are not so fearful of these people as we are of the vast army now buying their first truck—many of whom are ignorant of the use and care of these machines. And the way it looks now these numerous new buyers

would stand. One manufacturer advised a clause in the guarantee making it invalid if larger tires than those originally applied by the manufacturer were put on, stating that such would in future be his policy. The aid of the S. A. E. Standards Committee in standardizing the capacity of standard units was invoked by three.

Loudest rang the protest against deceptive salesmen who beguile owners into the purchase of trucks of unsuitable size by claims of overload capacity. Thirteen answers agreed that the most important step to be taken in the prevention of overloading was the elimination of this short-sighted method of marketing.

Over-tiring and over-rating of trucks were considered by some the roots of the abuse. Two advocated still more underrating of trucks and one urged underrating of tires. Two advanced the trailer as the solution, because it permits of handling overloads easily and without damage to the truck. Proper installation engineering was urged as the most lasting cure for the evil, since both overloading and underloading, equally destructive and expensive, are the result of improper application of trucks to work. One maker described a bonus system by which both agents and customers could be made to take an interest in the wear of tires such as would preclude overloading.

Would Retain Safety Factor

The suggestion that factors of safety be reduced, so that trucks would not stand overloading, so that they would not actually possess overload capacity, as many of them do now, and which is immediately magnified in the mouth of the salesman and the mind of the buyer, met with approval from but two, while nine singled it out for vociferous condemnation.

Four thought that through making the springs just able to sustain the rated load, and by providing large safety factors on the rest of the chassis, a truck of exceptional durability but discouraging to one who might seek to overload it might be made. Another substituted a small motor for weak springs.

Perhaps the most surprising thing in the replies was that of the total, only two were disposed to blame the tire manufacturer for his share in the encouragement of overloading.

Two manufacturers stated that in their opinion overspeeding was more destructive than overloading. Ten of those who replied gloomily predicted failure for any attempt to control the overloading situation, stating that there always had been overloading and that hence there always would be.

Seven expressed passive approval of the arduous efforts of the Sheldon com-

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are going to overload and overspeed, in spite of the warnings of the dealer, salesman and manufacturer—which will inevitably lead to the same old trouble, namely, misunderstanding, dissatisfied customers and knockers.

"We feel overloading will be quickly curtailed by the invention of a foolproof device for recording loads, which would put the question of abuse right up to the truck owner or driver, where it usually belongs."—FLOYD BARNET, sales manager, Nelson & Le Moon, Chicago.

Cut-throat Competition Responsible

"We find dealers and unscrupulous agents, in order to undersell legitimate competition, are selling trucks for a capacity considerably over their normal rating. In other words, to meet competition, it is a common practice for dealers to sell a 1-ton truck for 2-ton capacity in order that they meet the price of a competitor. Three-ton trucks are sold for 5 under the same conditions. This, of course, means trouble for the buyer, the agents, the parts manufacturers, and the truck manufacturers. It is a poor business policy and can only lead to one end—trouble for everyone concerned.

"We warn our agents not to enter this field of cut-throat competition, and to sell our trucks only on the basis of their rated capacity, which is governed by the capacity of the parts that go to make up the assembly. This policy results in small service repairs and satisfied customers. In short, as a business proposition, it pays."—G. M. EVANS, manager, Menominee Motor Truck Co., Menominee, Mich.

Oversize Tires Should Void Chassis Warranty

"All the manufacturers ought to get together and make it a rule that when larger size tires are used than the truck was originally equipped with, the guarantee should expire. Of course, in most cases the guarantee expires before there is any change of tires made. Hereafter, when we make up a guarantee we will insert a clause that if larger tires are put on than the original equipment, we will not be responsible for broken parts."—G. A. SCHACHT, president, G. A. Schacht Motor Truck Co., Cincinnati, O.

Void Parts Guarantees Also

"The truck makers should withdraw their guarantee in every respect if it be found that oversize tires have been substituted for the standard size furnished with the truck. If the parts makers would base their guarantee on the same condition they would pass the situation on to the truck maker most forcibly."—O. BRUENAUER, general sales manager, Gurney Ball Bearing Co., Jamestown, N. Y.

Co-operation Only Hope

"It hardly seems fair that the truck business should be subjected to a demand in the way of overload which no other machinery is required to meet. For instance, electrical machinery is not expected to carry 50 per cent overloads continuously, but it is common practice to overload trucks up to 100 per cent, and demand that they get away with it. It is a source of constant admiration to us, and an undying compliment to truck makers that the trucks do get away with it and stand up under outlandish maltreatment, but why is it necessary? It pany to bring about a concerted movement to throw off the useless burden of this ignorant practice.

Why Not a Load Governor?

Perhaps the most interesting proposal, since it contemplated the use of something which so far has been non-existent, was that of a load governor, to operate somewhat in the same manner as an engine-speed governor. One writer advocated a scale of some sort on the springs to register the load carried, so that the owner could not plead ignorance in extenuation of his abuse.

It is noteworthy that not one of the answers, even where decidedly vague, was in any way antagonistic to the proposal that something should be done about overloading. That all but a dozen had some constructive suggestion establishes a sound basis for hope that something can and will be done to impress users, salesmen and manufacturers with the simple folly of overloading.

Let Users Help

An unfortunate limitation to any of these solutions is that none of them involve the user in any other capacity than that of trustful listener. One of those who contributed to the correspondence pointed out that overloading was mainly confined to users of little experience and that the older users had learned the folly of the practice. He suggested that testimony of these users be gotten together and presented in convincing form before their unenlightened brethren among truck buyers and users, and including even some members of the trade.

merely means building a truck and giving it a rating far below its real capacity which makes for prices per rated ton capacity much too high. This means that the owner who uses his truck in a legitimate way has to invest more money than he should, that the other fellow may overload to his heart's content.

"To diagnose a trouble and to prescribe a remedy are two distinct problems. What truck maker will be brave enough to offer himself a martyr to the cause and build his trucks just strong enough to get by, thus subjecting his product to overload breakdowns continuously, and hence destroying his business? If all would act together—but will they?

"Hence, it seems that your suggestion as to a general educational campaign to enlighten the owner and driver as to the evil of his ways is the one best way out. Besides which educational methods, in general, are the surer ones, and produce more lasting results."—L. R. YEAGER, engineer, Hub Motor Truck Co., Columbus, O.

Bonus System the Cure

"With respect to your enclosure covering reprint on tires 'The Key to Overloading,' we ourselves have held this same opinion for a long time, and at one time tried to inaugurate a bonus policy between our users and drivers based upon tire mileage.

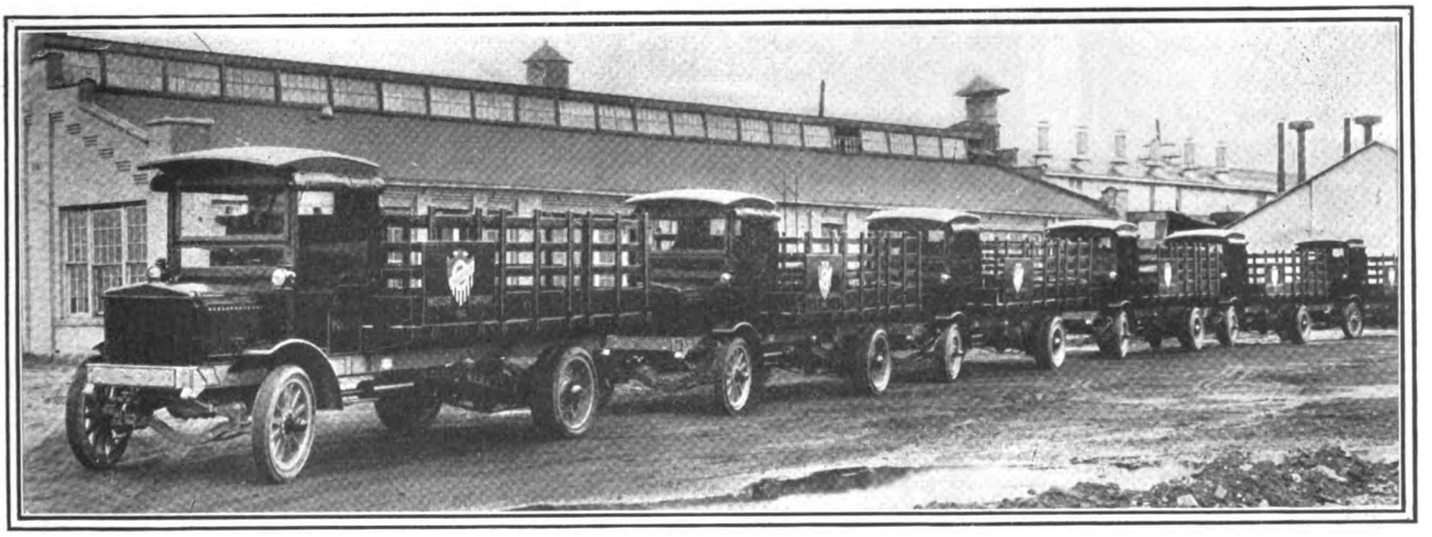
"We said to the user, if the truck was not overloaded, was driven carefully over rough roads and handled sanely in bad places, his tires would last a whole lot longer—incidentally his truck would receive the same proportionate increase of life. It appeared to us that it would be good business for him to say to the driver that he would divide up with him any increase of mileage which he got over the regular tire guarantee of 7000 miles. In other words, the user would be glad to pay the driver a bonus if he could show a greater mileage than the regular guarantee. For instance: If he makes 10,000 miles, the owner would pay the driver the actual cost of 1500 miles.

"In this way the driver would not only drive carefully, but he would be inclined to stick to his job at least until the tires wore out, making him a steadier employee.

"We believe if this practice could be inaugurated, material results would follow. If you care to put this proposition to other manufacturers, get their opinions, and see whether we cannot establish some universal bonus system along these lines. We would be glad to hear of your success and the opinions which others express.—JAMES C. MILLMAN, secretary and treasurer, Stegeman Motor Car Co., Milwaukee, Wis.

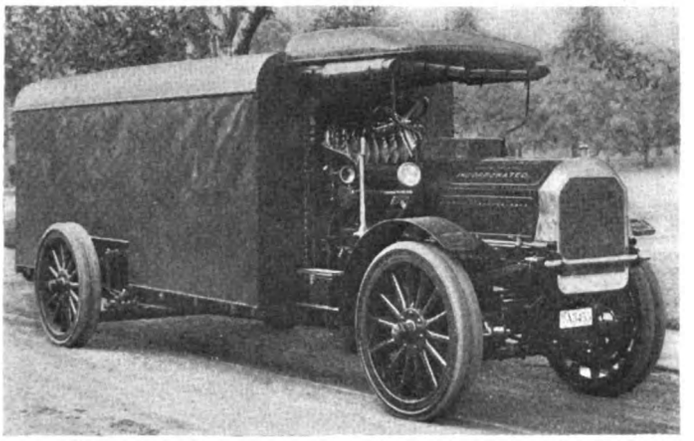
Tire Makers Should Aid

"The tire maker should recognize the seriousness of the existing conditions and co-operate with salesmen and manufacturers by refusing to equip a truck with larger tires than were originally supplied the truck.—E. C. SHUMARD, engineer, United States Motor Truck Co., Covington, Ky.

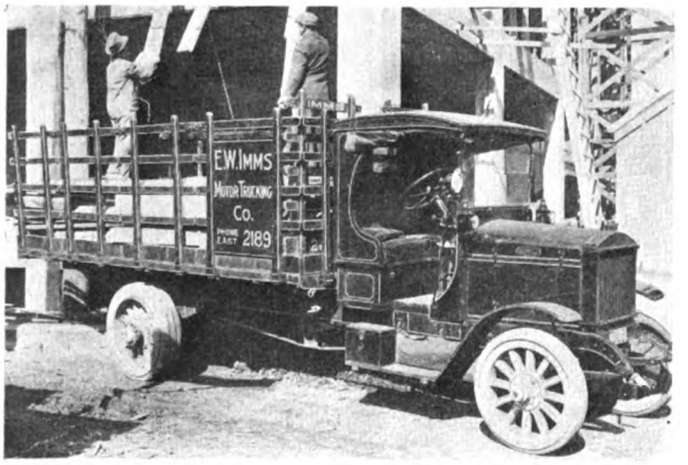


Fleet of six 3½-ton Federals recently sold to the Maxwell Motor Car Co., Detroit, and said to be the largest single order ever placed for trucks by any passenger car or accessory concern. The sale was made by the Thompson Auto Co., Detroit, and makes the thirtieth passenger car and accessory company now using Federal commercial vehicles. As shown, each truck is equipped with a staked body made in removable units for easy loading and unloading. The vehicles will be used for the haulage of goods between the Maxwell plants

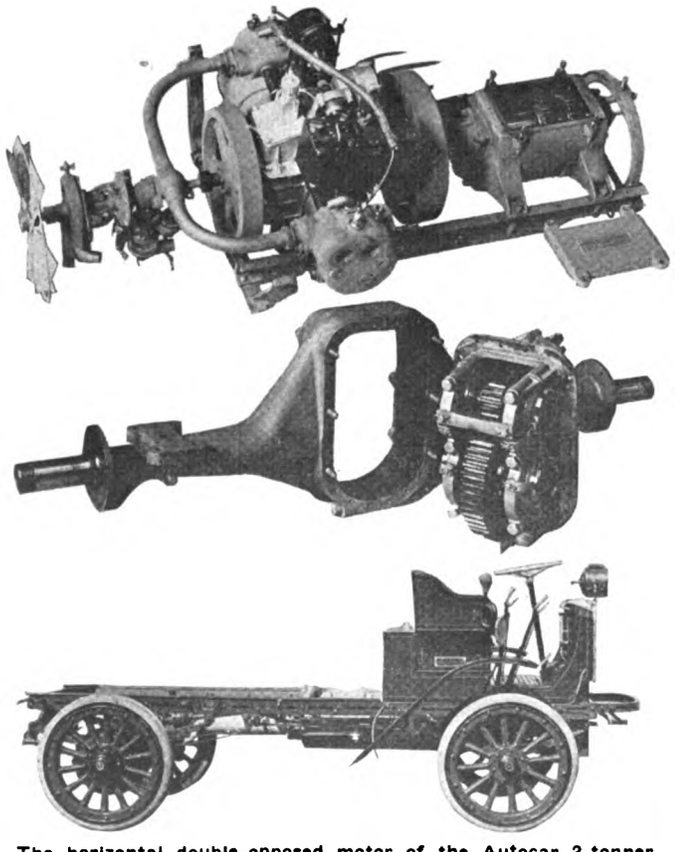
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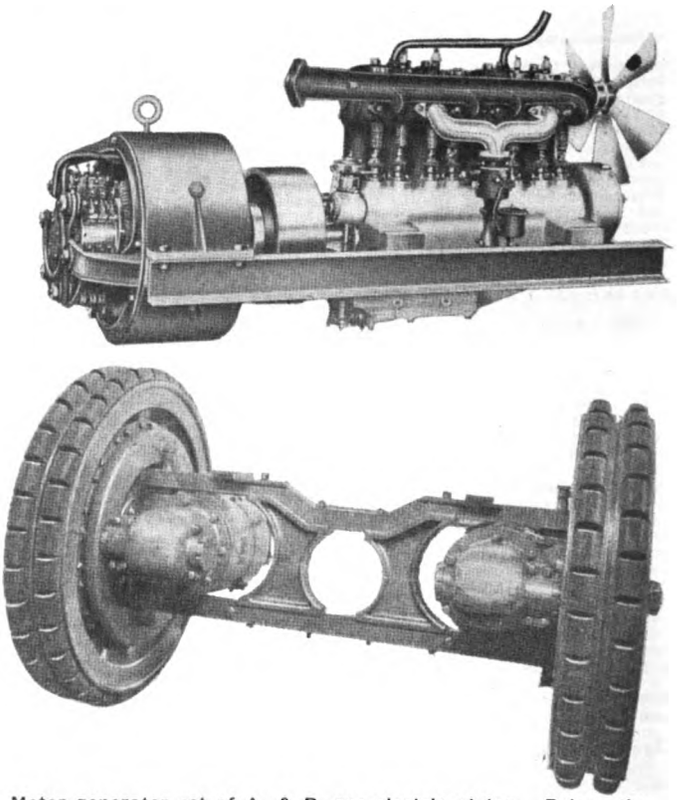
The A. & B. front-wheel-driven 5-tonner with low goose-necked frame and dual front tires



Worm-driven Acason 5-tonner with 10-in. single tires at the rear



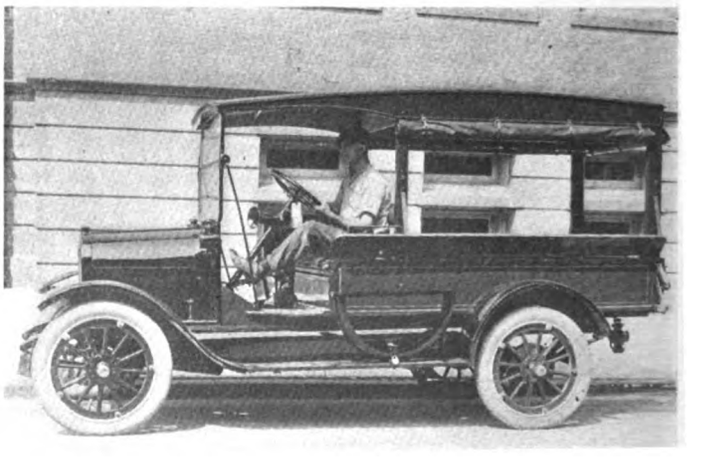
The horizontal double-opposed motor of the Autocar 2-tonner mounted on sub-frame with clutch and progressive gearset is shown at the top; the double-reduction axle in the center and the chassis below



Motor-generator set of A. & B. gas-electric at top. Below, the A. & B. front axle showing its construction and the driving motors



Acme worm-driven 2-tonner assembled from standard parts. Its price has been increased $100. The Acme line consists of three models



Atlas 1,000-pound delivery vehicle. Its price has been increased $60. It is assembled from standard parts and sold nationally

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American Motor Truck Makers' Plans and Products in Brief Résumé

1917

New Models and Prices, Changes in Construction and Methods of Manufacture and Sale Outlined in Short Illustrated Notes for Buyers' Information

Part I—A-H

CONSISTENT with its established policy for several years, THE COMMERCIAL VEHICLE presents herewith the first installment of its annual review of gasoline truck manufacturers and their products.

Each item is intended to introduce one particular maker to truck purchasers and to the trade, to point out the characteristics of the various chassis offered and the salient features of the maker's business policy.

Thumb-nail sketches of each line are given, although no attempt has been made to give a complete technical description of each product as the specifications were given in the November 1, 1916, issue of THE COMMERCIAL VEHICLE. In cases where changes in prices have been made from the tabulated specifications, these are included in the short descriptions. New models added since November 1, 1916, are also included.

Illustrations showing the characteristics of the various models are given on the pages facing the descriptions of those vehicles. Technical details which differ from conventional design are also pointed out.

The arrangement of the items has been made alphabetical as far as possible for easy reference.

A. & B.

3- and 5-ton Gas-electrics Unchanged

DIFFERING from the conventional design in that they have gas-electric drive to the front wheels, a low-dropped frame and large wheels, A. & B. trucks, made by the American & British Mfg. Co., Providence, R. I., are unchanged in design from the 1916 product. The 1917 prices have been increased slightly due to the higher cost of materials.

A. & B. trucks were originally designed as tractors for fire engines, the A. & B. company manufacturing the well-known Amoskeag fire apparatus. The vehicles have been adapted for commercial service by a low goose-necked frame which provides an extremely low platform height for easy loading.

The trucks are a manufactured product except for the electrical portions. They are sold principally in New England, and for cash only, no plan of time-payments being employed.

Standard types of bodies are not supplied, each being built to suit the needs of the particular purchaser. Starting and lighting equipment is furnished on both models. The use of trailers is indorsed by the A. & B. company, although it has not made any provision in either model for such use.

Each model follows the same general lines and differs only in the size of the load-carrying members, the motors and wheelbases of each being the same. The motive power is provided in each case by a motor-generator set carried on a sub-frame supported from the goose-necked frame at the front.

Acason

Worm 2- and 3½-tonners with Four Speeds

NEW in 1916, Acason trucks, made by the Acason Motor Truck Co., Detroit, are exactly the same as in 1916, both as to design and price, except that a new 1½-ton model is to be offered.

Acason trucks are an assembled product, which is sold in the United States and Canada and also in France and England. Acason dealers may sell trucks on time payments if they so desire, but the Acason company does not become a party in the transaction.

Standard staked - platform bodies are carried in stock. Electric lighting and starting is not endorsed by the Acason company, but it will supply an electric spot light and storage battery at an extra charge when specified. Trailer drawbar attachments are furnished on order.

The Acason design follows standard truck engineering practice except that it includes a four-speed gearbox instead of a three-speed one. Worm drive is employed on the Hotchkiss plan.

American

New Worm-driven 2-tonner Made In Connecticut

MAKING ITS DEBUT in the latter part of 1916, the American truck, made by the American Motor Truck Co., Hartford, Conn., is now offered in a 2-ton size. It is planned to add three other models of ½, 1 and 3-ton capacity.

The American vehicle is the design of A. D. Crossly, formerly chief engineer for the Pope-Hartford Co., and is made of standard parts purchased from specialists. It is planned to sell it throughout the United States.

The 2-ton model is furnished with a standard type of body with removable staked panel sides so that it can be loaded from either side or the rear. It is furnished with electric lighting and starting as standard equipment.

The truck has its motor under a hood forward of the dash, a separate three-speed selective gearset and final worm drive with torque and propulsion members. Right drive is employed.

Acme

New 3½-tonner Added—Now Three Models in All

A THREE-MODEL line of Acme trucks is offered for 1917, a new 3½-tonner being added to the 2-ton model carried over from 1915 and a 1-ton vehicle brought out during 1916. The 2-ton model has been increased $100 in price.

No marked changes have been made in the models carried over from last year. All employ final worm drive and are assembled from standard parts. They are sold throughout the United States, and may be purchased on a time-payment plan in which one-fourth the sale price is paid in cash and the balance in twelve equal monthly installments.

Standard bodies are furnished for Acme trucks, about 50 per cent of which are so equipped when sold. Electric starting and lighting are endorsed on the 1-tonner, which is so equipped for $125 extra. Lighting equipment consisting of a Kemco fan-type generator and storage battery is furnished on the two heavier models at $100 extra.

Provision is made for the use of Acme trucks with trailers when so ordered. The two smaller models follow the same general design, employing pressed steel frames, worm final drive without radius rods or torque arms. The 3½-tonner has a rolled steel frame, worm drive and torque and propulsion members. All three models have vacuum-feed gasoline systems.

Allis-Chalmers

Creeper-driven Tractor Is Being Re-designed

OFFERED first in 1915, the Allis - Chalmers track - laying tractor-truck, made by the Allis-Chalmers Mfg. Co., Milwaukee, Wis., is now being re-designed. The vehicle was not actively marketed during 1916 because of the great increase in the standard work of the Allis-Chalmers company occasioned by the war. The maker is one of the largest manufacturers of machinery in the world. It is expected that the new design will be perfected and a new vehicle built by April or May, 1917.

It is not known at this writing what changes will be made in the new vehicle as compared with the old. The latter had two pivoted creepers at the rear and large steel wheels at the front. These were carried on an axle pivoted to the front end of the frame, which was bottle-

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necked and extended forward for a distance equal to the radius of the wheels. This construction permitted the wheels to turn at great angles to the center line of the vehicle without fouling the frame. The vehicle was intended for use as a road truck, although its greatest field was for hauling heavy loads in trailers because of its great tractive effort.

Armleder

Models Reduced to Two—Chain Drivers Dropped

DROPPING its two chain-driven vehicles, the Armleder line for 1917 consists of 2- and 3½-ton worm-driven models which are carried over from last year practically without change either in design or price. Armleder trucks, sold only within a radius of 100 miles of the O. Armleder Co.'s plant in Cincinnati, Ohio, previous to 1916, were last year offered all over the country by dealers in the principal large cities.

Armleder trucks are an assembled product which can be purchased on time payments from the Armleder company in the Cincinnati territory only. One-third of the chassis price is required on delivery and the balance within 8 months. Deferred payments bear interest at 6 per cent, and are covered by a chattel mortgage on the chassis.

A complete line of stock bodies is carried, the Armleder company being one of the oldest horse-wagon builders in the Ohio territory. Practically all Armleder trucks are sold with bodies, although the latter are sold for cash only and are not included in any time-payment plan.

Both models are furnished with electric-lighting systems at an extra charge of $60. When so ordered, provision is made on Armleder trucks for use in connection with trailers. The feature of the Armleder truck is its springs, which are without shackles, the tips being free and bearing on friction plates.

Atlas

New 1,000-pounder Replaces Martin Line

NEW in name and partly in design, the Atlas 1000-pounder is the only model offered by the Martin Carriage Wks., York, Pa., which in 1916 discontinued its four models of Martin chain-driven trucks of 1-, 2-, 2½- and 4-ton capacity. The latter models were also offered with optional worm drive. The 1917 1000-pounder differs from that offered in 1916 by the use of a wet-disk clutch and a slightly higher gear reduction. Its price in the chassis has been increased from $690 to $750.

The Martin company has been engaged in the manufacture of horse wagons for the past 31 years and has built motor trucks for 10 years. Until 1916, all of the latter were characterized by having motors under the floors.

The Atlas 1000-pounder is assembled from standard parts and is sold from New England to California. It is sold to dealers for cash and they may sell it on time payments if they so desire, but the Martin company does not enter the transaction. The Martin company furnishes the Atlas chassis with any one of thirty stock bodies. The vehicle is not equipped with electric lighting or starting.

Autocar

2-tonner Same in Price and Design

PRACTICALLY THE SAME as the vehicle made by the Autocar Co., Ardmore, Pa., in September, 1913, except for minor refinements in details, the 1917 2-ton Autocar is sold at the same price as in 1916. The Autocar is made in but one model. The 1916 price was $200 less than in 1915. This reduction in price was made possible by a greater production secured by means of new factory buildings.

Two new buildings were added during 1916 and it is expected that the 1917 production will be 30 per cent in excess of that in 1916, which in turn was 30 per cent more than in 1915.

The Autocar is a manufactured product which is sold in all parts of the world. It may be purchased on a time-payment plan, in which 50 per cent is paid down and the balance in twelve equal monthly payments. A chattel lease is carried on the chassis to cover the deferred installments.

The Autocar company will furnish its trucks with any one of a large number of standard bodies, including dumping types for contractors and coal dealers. An electric starting and lighting system may be had at extra cost. Autocars are not recommended for use with trailers.

The Autocar chassis is characterized by its horizontal double-opposed motor under the seat, short wheelbase and double-reduction final drive. It is one of the three vehicles now offered on the market with that type of final drive. The chassis is sold with solid or pneumatic tires at option.

Atterbury

1½ and 5-ton Models Added —Five Sizes in Line

A NEW 5-TONNER for 1917 and a new 1½-ton size added in 1916 will be offered this year by the Atterbury Motor Car Co., Buffalo, N. Y., in addition to its 1-, 2- and 3½-ton models carried over from last year practically without change. It is expected that the prices of all models will be increased shortly after January 1, 1917.

Atterbury trucks are an assembled product which is sold nationally. The production was slightly hampered during 1916 by reason of a fire which destroyed a portion of the plant. Atterbury trucks are produced as chassis, although special bodies are built in the Atterbury factory to suit the needs of the purchasers. None of the five chassis offered is equipped with an electric starting or lighting system.

All five models follow the same general design, which is in accord with standard truck engineering practice. The details of the new 5-tonner are not available at this writing, except that it will have final worm drive. The other models all have unit power plants, four-speed gearboxes, worm drive, Hotchkiss drive and pressed steel frames.

Avery

Five-model Line Continued Without Change

CONTINUED WITHOUT CHANGE in design or price, the Avery line, made by the Avery Co., Peoria, Ill., consists of 1-, 2- and 3-ton trucks, with their motors under hoods; a 5-tonner with its motor under the floor and a 3-ton farm truck with wood tires and its motor between the seats. The latter vehicle, made by the Avery company for the past 9 years, is said to have been the first four-cylinder motor truck placed on the American market. The Avery company also manufactures various sizes of farm tractors. It also for a time marketed the Glide, a 1,500-pound delivery vehicle, made by the Bartholomew Co., also of Peoria.

Avery commercial vehicles are partly manufactured and partly assembled. They are sold mostly in the farming regions of the West and Southwest and may be purchased on time payments. The Avery company has a large assortment of standard bodies in stock and practically all of its trucks are sold with bodies.

Electric lighting and starting are not indorsed by the Avery company, but it will supply such equipment at an extra charge. Avery trucks are not indorsed for use with trailers. They are provided, however, with an automatic coupler for such use when so ordered.

Except for the type and placing of the motors, the wood tires on the farm truck and a unit power plant on the 1-tonner, all Avery models follow the same general design in that they have dual ignition, selective gearsets in unit with the jackshaft, governed motors, final chain driven and right steer. The 1-tonner is an exception in that it has left steer.

Available

5-tonner Gives Available Four-truck Line

PRICE INCREASES and the addition of a new 5-ton model feature the Available line for 1917, which also includes 1-, 2- and 3½-ton vehicles. The price of the 1-tonner has been increased from $1,500 to $1,700; the 2-ton model from $2,000 to $2,250 and the 3½-tonner from $3,000 to $3,300. The new 5-ton size sells at $4,400. The three smaller models are carried over from last year with only minor changes in design. All four models are worm driven.

Available trucks are an assembled product which is sold only in Chicago, the home of the maker, the Available Truck Co. They may be purchased on time with a 25 per cent cash deposit and the balance in 12 months.

Bodies for Available trucks are built on order only. Electric starting and lighting are not indorsed by the Available company, and such equipment is not furnished on its trucks. Available vehicles are made with provision for trailer use if so specified.

All four models follow the same general design and have unit power plants, rolled steel frames, worm gears and Hotchkiss drive except the two larger models, which have radius rods for propulsion.

Beech Creek

Two Four-wheel Drivers—One New for 1917

FIRST PRODUCED in 1916, the one 3-ton model made by the Beech Creek Truck & Auto Co., Beech Creek, Pa., is continued for 1917 in addition to a new 3-tonner selling at the same price as the old. This price remains the same as in 1916.

Barker

Two Worm Models Continued Without Change

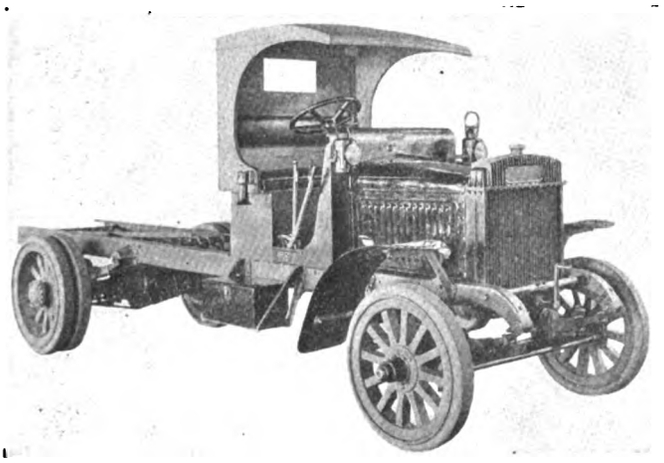
PRODUCED in New England and sold in the same territory, the 1- and 2-ton worm-driven trucks made by C. L. Barker, Norwalk, Conn., are carried over from 1916 without change in design or price,

Barker trucks are an assembled product which may be purchased on installments. Each chassis so sold is covered by a lease held by the Barker company until the final payment has been made.

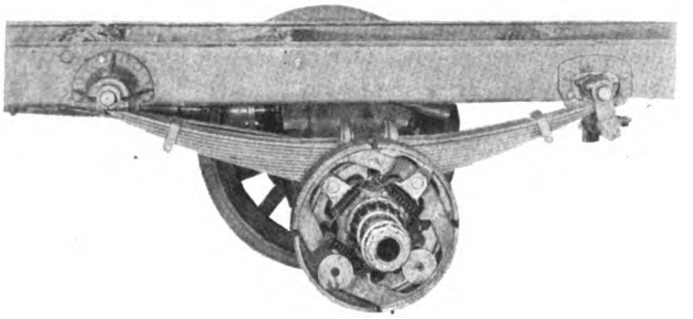
The great majority of Barker trucks are sold complete with bodies. They are also provided with trailer connections if so ordered. Electric starting and lighting are not indorsed by the Barker company, and accordingly its trucks are not so equipped.

Both models follow accepted truck engineering practice in design, except that the 1-tonner is

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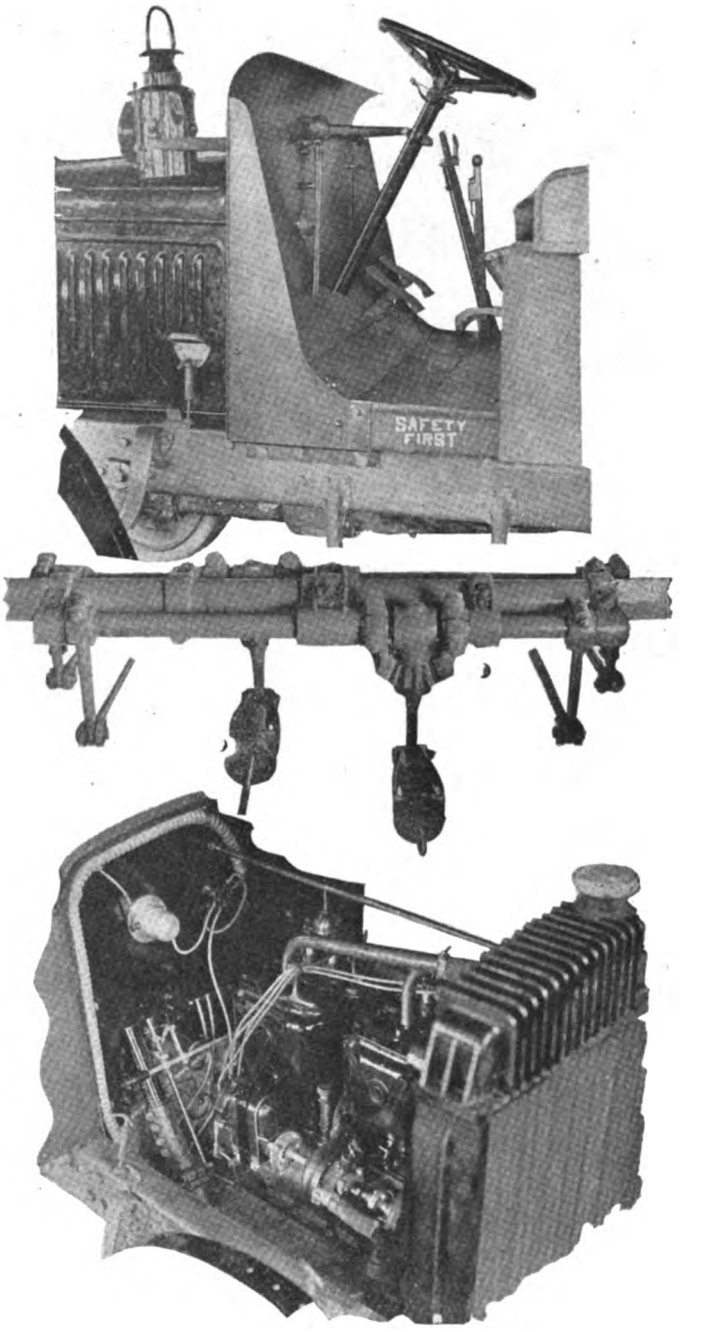
Atterbury 3½-ton worm driver showing frame construction and radiator. To the right, at top, Atterbury cab showing controls, neat sheet-metal dash, oil sight-feed and Adlake truck lamps



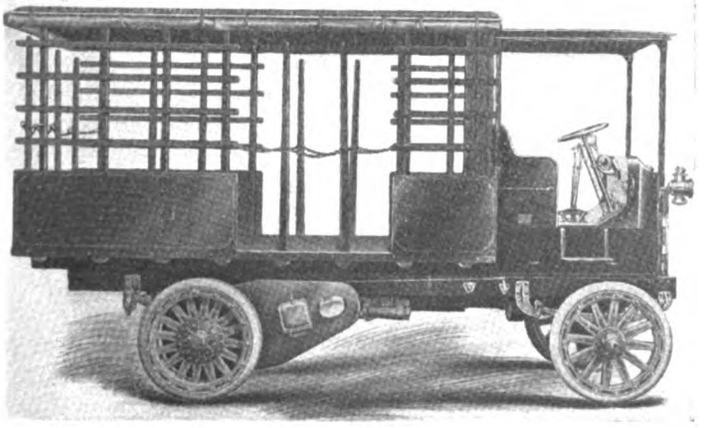
Timken axle on Atterbury 3½-tonner showing brakes and the self-oiled springs through which it transmits the driving effort



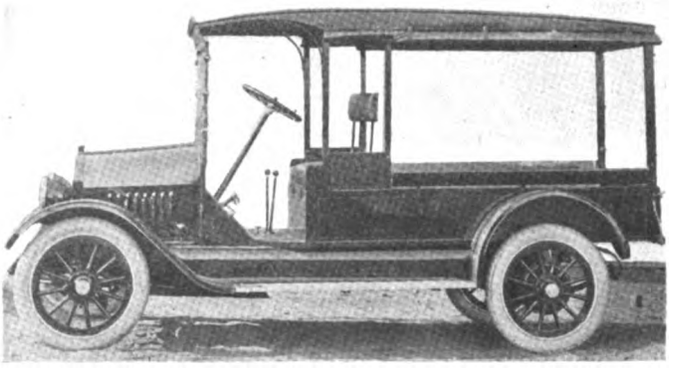
Available 3½-tonner, one of a line of four worm-driven models. It is an assembled product whose price has been increased $300



Center, above, differential type of Atterbury brake eveners with hand adjustments. Below, the Atterbury 3½-tonner's motor



Avery 3-tonner, one of a line of five chain-driven models continued without change from last year. The prices are the same

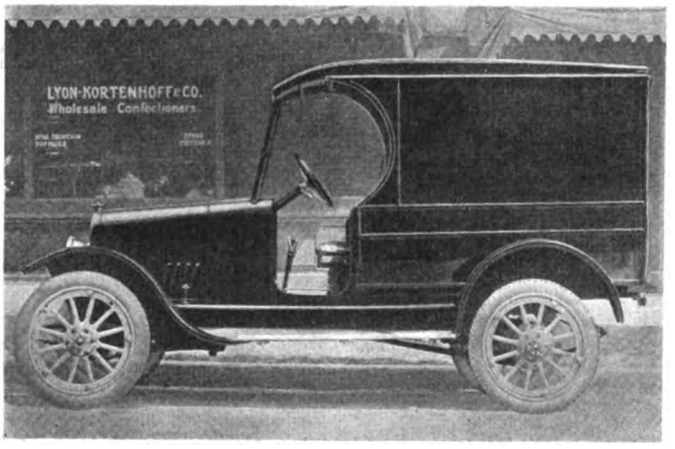


Bell 1200-pounder which is furnished with starting and lighting equipment and sold complete with open or closed body

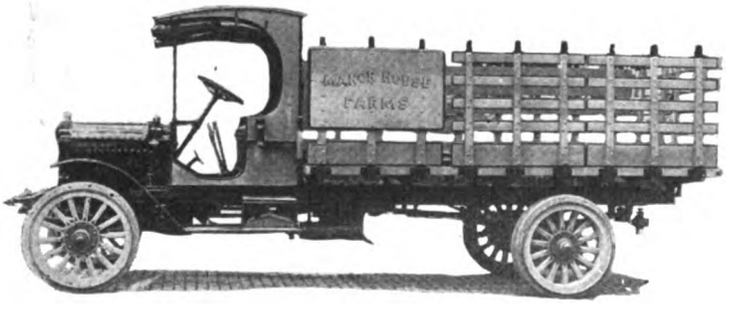
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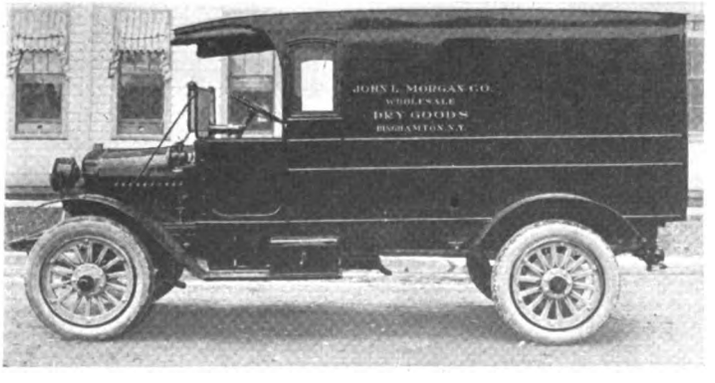
Blair worm-driven 4-tonner with its motor between the seats



Briscoe bevel-driven 1,000-pounder sold complete with either a canopy or panel body. The prices have been raised slightly



Brockway 2-tonner with worm drive. Its price has been increased $125. It is one of a four-model line ranging from 1 to 3½ tons. Brockway trucks are assembled from standard parts



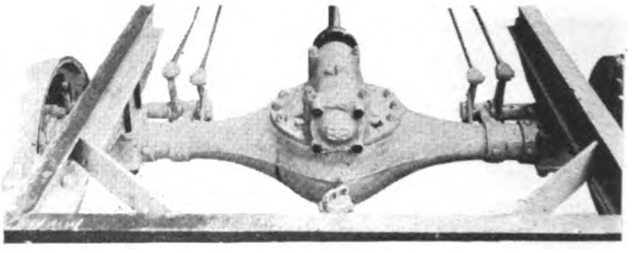
Brockway 1-tonner whose price has been increased $50 from $1,450 to $1,500. Like other Brockways, it is worm driven



Bessemer 2-tonner with worm drive. Its price has been raised $200. Shown with hydraulic hoist on contractor's dump body



Brinton 1,500-pounder with standard form of panel body. It is worm driven and has electric lighting as standard equipment



Detail of the Brinton ¾-tonner looking toward the front and showing the light Sheldon axie and flexible frame



Bourne 3½-tonner which is equipped with the Entz system of electro-mechanical transmission. No spring shackles are used

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equipped with 42-in. wheels all around. Both models are equipped with the same sized motor, 4 by 5, with a N.A.C.C. horsepower rating of 25.60. In each case the power is taken from the motor through a dry-plate clutch and selective four-speed gearset mounted in a unit power plant. Both the torque and the propulsion are taken through the springs.

Bauer

Double-reduction Drivers Unchanged

BAUER trucks, made by the Bauer Machine Wks. Co., Kansas City, Mo., are continued for this year without change in design or price. The Bauer line consists of but two models, one of ½-ton capacity and the other of ¾-ton burden, each of which is the exact duplicate of the other except in wheelbase. Both are featured by the use of douple-reduction rear axles.

Bauer trucks are equipped with motors, clutches and gearsets made by the Bauer company, whereas the other component parts are purchased from specialists in each particular line. The sale of Bauer trucks is local to Kansas City and its surrounding territory.

The ½-ton model has a 100-in. wheelbase and the 1,500-pounder, 110. Outside of this difference the two models are practically counterparts, each having a 3¾ by 5 motor in a unit with a wet-disk clutch and three-speed selective gearset. The driving propulsion and torque are taken by a torque arm in each case. Elliptic springs are used in the rear and left drive and center control are employed.

Blair

No Changes Made for 1917—Sub-frames a Feature

NO CHANGES in design have been made in any of the Blair truck models for this year. They are manufactured by the Blair Motor Truck Co., Newark, Ohio, and are offered in 2-, 3-, 4- and 5-ton models, all worm driven. The price of the 5-tonner has been reduced $250, from $4,500 to $4,250. The prices of the other models remain the same.

They are assembled from standard parts made by specialists and are sold nationally. The Blair company is prepared to furnish dumping bodies with pneumatic hoisting gears for its larger models. Electric starting and lighting units are not indorsed for use on Blair trucks. They are guaranteed for use in connection with trailers under advantageous conditious.

All models of the Blair line differ from the conventional truck design in that each is provided with a rigid sub-frame which carries the motor and the entire transmission. The sub-frame is attached to the main frame at two points at the front and at one point on the rear axle. Each model is also supplied with a three-speed individual clutch gearset.

Bell

1,200-pounder Continued Without Change

ONE MODEL of Bell delivery car, made by the Bell Motor Car Co., York, Pa., continues to be the offering for 1917. It is mounted on the same chassis as the Bell passenger car, and differs from it only in that it has a lower gear reduction and a different type of ignition apparatus.

The Bell commercial vehicle is assembled from standard parts and is sold mainly throughout the East. It is offered complete with either an open or panel body, the former selling for $735 and the latter for $780. Electric starting and lighting are furnished as standard equipment.

The vehicle follows accepted practice in light delivery vehicle design and has a unit power plant, bevel drive with the torque and propulsion taken through the springs and left steer.

Briscoe

1,000-pounder Sold with Two Body Options

BUILT on its passenger car chassis, the Briscoe Motor Co., Jackson, Mich., offers one type of ½-ton delivery vehicle, which is sold complete with either a canopy top or panel body. The price of the vehicle with canopy top has been increased $35, from $665 to $700, and that with the panel body $50, from $675 to $725.

The Briscoe is a manufactured product sold nationally. It follows passenger car lines in the shape of the motor hood, which is carried aft of the dash with a straight-line effect, to give some slight protection for the driver in winter weather. The cab doors are eliminated to provide an easy entrance and exit for both driver and helper. Final drive is by bevel, with the three-speed gearset on the rear axle.

Bessemer

New 2-ton Internal Gear Added to Line

DROPPING its ¾-ton internal-gear-driven model and 1½-ton chain-driven vehicle offered at the beginning of 1916, the Bessemer Motor Truck Co., York, Pa., now produces one 1-ton model, two 2-tonners, one of 3½ tons and a 5-tonner. The 5-ton model and the worm-driven 2-tonner were new during 1916, but the internal-gear-driven 2-tonner is brand new for this year. The 2- and 3½-ton worm-driven models are carried over from 1916 without change in design, but the price of the smaller vehicle has been increased $200 and that of the larger $300. The price of the 1-tonner has been increased $20 over that as announced in the November 1, 1916, issue of THE COMMERCIAL VEHICLE, or from $975 to $995.

Bessemer trucks are an assembled product which is sold throughout the United States and abroad. They may be purchased on time payments.

The Bessemer line follows conventional truck designs. The 1-tonner has a unit power plant including a dry-disk clutch and three-speed selective gearset. The other models employ cone clutches with three-speed gearsets mounted amidships. The 1- and 2-tonners employ Hotchkiss drives.

Brown

½-tonner on Passenger Car Chassis with Body Options

PRODUCED first in 1916, the Brown 1,000-pound delivery vehicle, made by the Brown Carriage Co., Cincinnati, Ohio, is built on the same chassis as used for the passenger car manufactured by the same concern. It is an assembled vehicle which is sold complete with body with an option between an inclosed type, an open express design and one with a top and roller curtains.

Aside from the body, the vehicle is identical with the passenger car made by the same company. Electric starting and lighting are furnished as standard equipment.

The vehicle follows conventional passenger-car design with its motor under a hood with louvres and modish rounded lines, unit power plant and bevel final drive.

Brockway

Chain-driven Models Dropped —3½-ton Worm Added

DISCONTINUING its two 2,500-pound and one 4,000-pound chain-driven models offered at the beginning of 1916, the Brockway Motor Truck Co., Cortland, N. Y., now makes a four-model line consisting of 1-, 1½-, 2- and 3½-ton vehicles, all of which are worm driven. The 1917 1-tonner has taken the place of one of the 1916 2,500-pounders and the 1917 1½-tonner the other. The 3½-ton model was new in 1916 and is carried over without change in design or price. The two smaller units have each been increased in price, the 1-tonner from $1,450 to $1,500; the 1½-ton size from $1,825 to $1,875 and the 2-tonner $125, from $2,125 to $2,250.

Brockway trucks are an assembled product which is sold throughout the United States and abroad. They may be purchased in this country on installments with a substantial initial deposit and the balance within 1 year. The great majority of Brockway trucks are sold complete with bodies because the Brockway company maintains its own body-building plant.

Electric lighting and starting equipment is not indorsed by the Brockway company, and its vehicles are not fitted with such apparatus as standard equipment, although it will be furnished as an extra when specifically ordered. Provision has been made for the use of Brockway trucks with trailers. All four models follow conventional truck designing practice.

Bourne

First Truck Equipped with Entz Transmission

EXPERIMENTED with for the past year, two models of trucks with the Entz electro-mechanical transmission similar to that used on Owen-Magnetic passenger cars, will soon be put on the market by the Bourne Magnetic Truck Co., Philadelphia, Pa. The vehicles will be of 2- and 3½-tons capacity.

The Bourne chassis is not an entirely new creation built around the Entz unit, for S. N. Bourne, the head of the Bourne concern, has built several trucks with ordinary gear transmissions for the Atlantic Refining Co., in Philadelphia.

The Bourne truck is an assembled product. The 2-ton model will sell at $3,150 and the 3½-tonner at $3,850.

Aside from the transmission, the Bourne has several details of construction which differ from the conventional. The most noticeable of these is the method of spring mounting in which no spring shackles are used. The end of the spring is flat and makes a square contact with a rocking block. This block has a rounded head which rests in a groove in a bracket attached to the frame.

Both models are fitted with four-cylinder gasoline motors to the crank-cases of which the electric motors and generators are bolted in the same manner as in the Owen-Magnetic car. An electric lighting and starting system is provided by the driving system. The final drive is by worm.

Burford

Internal-gear and Worm Models Continued

BURFORD trucks, made by the H. G. Burford Co., Fremont, Ohio, are offered in two sizes, as last year. The 2-tonner, an internal-gear-driven unit, is unchanged except for a 12-in. increase in the wheelbase and an increase in price of $250, from $2,000 to $2,250.

The Burford company was formed in 1915 and took over the plant of the Lauth-Juergens Motor Car Co., in Fremont. The present 2-ton Burford truck is

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the same as that known as the Fremont-Mais in 1915 with the exception of a change from a progressive to a selective type of gearset, made in 1916. The 3½-ton Burford is worm driven and is carried over from last year with practically no changes.

Both models are assembled products which are sold throughout the United States and abroad. The axles and jackshaft of the internal-gear-driven model are of Burford manufacture. Both models are furnished with electric lighting units as stock equipment.

The 2-tonner has a 3¾ by 5½ motor with a N.A.C.C. horsepower of 22.50. It is in a unit with cone clutch and selective three-speed gearset. Hotchkiss drive is employed. The frame is of pressed steel.

The 3½-ton model has a 4½ by 6¾ motor with a rated horsepower of 32.40. It is of the L-head type and drives through a dry-disk clutch to a four-speed selective gearset located amidships. The final drive is by worm, the torque being taken through the springs and the propulsion through radius rods.

Bulkley-Rider

Huge Tractor Nearest to Road Locomotive

PERFECTED about the middle of 1916 after several years of experimentation, the Bulkley-Rider tractor, made by the Bulkley-Rider Tractor Co., Los Angeles, Cal., is the nearest thing to a road locomotive now offered on the American market. It is light in weight and yet a giant in size, with enormous pulling power.

It is partly manufactured and partly assembled. At the present time it is sold mostly in Los Angeles and vicinity and along the western coast.

It differs radically from previous types of road tractors in that it has a double-frame construction, the inner sub-frame carrying the power plant on independent springs from those which support the main frame. The latter carries the radiator, cab and tank.

The tractor has a 90-hp. motor and drives through two separate gearsets, one a primary and the other a reduction gearset. By this means the vehicle is capable of six speeds forward and when running on the unreduced high gear has a maximum speed of 20 m.p.h. On the lowest gear the total reduction is 96 to 1.

The motor, whose power is transmitted by chains to the rear wheels, is placed beneath the floorboards of the cab, the latter high in the air, as shown in the illustration on page 29. Directly aft the driver's cab is a cylindrical gasoline tank placed crosswise of the vehicle and supported in a cradle on the main frame. Directly aft of the tank is the load-carrying platform on springs entirely separate from those for the chassis. All road shocks are provided for by the load springs and a pair of plungers which act as shock absorbers for all jars transmitted to the vehicle by trailers when negotiating rutty roads.

The tractor is equipped with a winch capable of pulling a 28,000-pound load on a cable at the speed of 70 feet per minute. By this means the tractor can pull itself and its load up the side of the steepest bank. A patented hydraulic jack supporting two extra wheels with metal pads is provided for use in rough country. This device is used to provide a four-wheel-driven vehicle for rough going. For use on fair roads the regular steel rear wheels are designed so that they can be fitted with a similar device when necessity demands. When operating over boulevards, the steel tires on the rear wheels are replaced by rubber ones.

Brinton

1,200-pounder Changed and 2½-tonner Continued

OFFERED in two models, Brinton trucks, last year made by the Chester County Motor Co., Coatesville, Pa., are now manufactured by the Brinton Motor Truck Co., Philadelphia. Last year's 2½-tonner is continued without change but the 1916 1,200-pounder has been changed to a 1,500-pound vehicle with an increased wheelbase and the price raised $180, from $815 to $995. The price of the 1916 2½-tonner remains the same.

Both models are assembled products which are sold principally throughout the East and South. They may be bought on time payments, which include a small initial payment and the remainder in negotiable notes. Brinton trucks are equipped with electric lighting units as standard equipment but not with starters.

Worm drive is employed on both models, each of which follows conventional truck engineering practice. Both employ unit powerplants with dry-disk clutches and three-speed selective gearsets.

Chase

Five-model Line—Three Sizes New in 1916

ADDING three new models during 1916, the Chase line, made by the Chase Motor Truck Co., Syracuse, N. Y., consists of five models of 1-, 1½-, 2½-, 3- and 3½-ton capacity. The 1½-, 2½- and 3-tonners were new last year. The 1916 2-ton size has been replaced by the 1917 2½-ton model, leaving only the 1-tonner and the 3½-ton size carried over from the previous year.

The price of the 1-tonner has been increased $75, from $1,650 to $1,725, and that of the 1½-ton model $75, from $1,950 to $2,025.

The Chase company previous to 1915 offered a line of chain-driven trucks which were characterized by three-cylinder air-cooled motors. The last of that line, a 1,000-pounder, was discontinued in 1915, when the remaining models offered were fitted with water-cooled motors and final worm drive.

Chase trucks are partly assembled, and are sold nationally and abroad. About 60 per cent of Chase trucks are purchased as stripped chassis.

All Chase models follow the same general design with distinctive hoods and cabs. The motors of the 1- and 1½-tonners are of the same size, 3½ by 5¼, with a horsepower of 19.61. The motors of the 2½- and 3-ton models are also of the same size, 4⅛ by 5½, horsepower 27.20, and that of the 3½-tonner, 4¼ by 6, with a horsepower of 27.00. All motors are of the unit power-plant type, with dry-disk clutches except the two largest ones, which have wet-disk types. All models employ selective gearsets and final worm drive. Three-speed gearsets are used on all except the 3½-tonner, which has four speeds. Hotchkiss drive is used on all models except the largest, which has a torque arm.

Commerce

1-ton Internal-gear Model Added to Line

ONE new model of 1-ton capacity fitted with an electric starting and lighting unit has been added to the Commerce line, made by the Commerce Motor Car Co., Detroit, during 1916. The 1916 ¾-tonner is carried over without change in design or price. All the large units of both models are assembled and the small parts manufactured by the Commerce company.

Commerce trucks are sold throughout the United States and abroad and they may be purchased from the company on installments in co-operation with the Bankers' Commercial Corp. Both models are sold in chassis form, including the driver's seat, or with a standard type of open express body. Approximately 80 per cent are sold complete with bodies. Electric starting and lighting are furnished as standard equipment on the 1-ton model and are optional on the ¾-tonner at an extra charge of $75.

Both models are furnished with flexible pressed-steel frames and with motors of the same size, 3½ by 5, 19.61 hp. Both models are equipped with finned-tube radiators with cast cases. No governor is fitted on the smaller unit, but a centrifugal type driven from the driveshaft is fitted as standard equipment on the 1-tonner. Unit powerplants with cone clutches and selective gearsets are furnished for both sizes. The smaller has bevel final drive and the 1-tonner internal-gear drive, the latter taking the torque and propulsion through the springs and the former the propulsion through the springs and the torque through a torque arm. Left drive is employed in each case.

Columbia

Internal-gear 2-tonner Same as in 1916

COLUMBIA trucks made in only one model of 2 tons capacity, are offered by the Columbia Motor Truck & Trailer Co., Pontiac, Mich., without change in design or price as compared with the 1916 vehicles.

The Columbia was formerly known as the Kalamazoo, the Columbia company succeeding the Kalamazoo Motor Truck Co., Kalamazoo, Mich. The Columbia is an entirely new vehicle as compared with the old Kalamazoo, and has internal-gear drive instead of chain. It nevertheless retains something of the Kalamazoo appearance.

The Columbia truck is an assembled product sold in the eastern and central states and in Europe, where it is known as the Shakespeare. The Columbia company also manufactures four-wheeled trailers for use with its trucks.

The vehicle has a pressed-steel frame and a 4⅛ by 5½ motor, 27.20 hp., which drives through a cone clutch, and three-speed selective gearset mounted amidships. The driving torque and propulsion are taken through the springs.

Coleman

2 and 3-tonners Continued Without Change

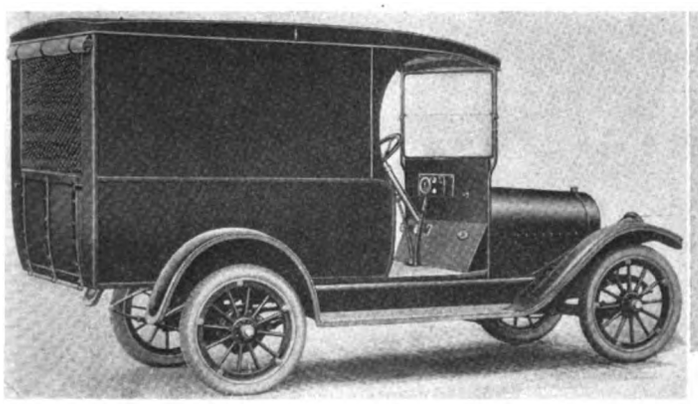
CONTINUING last year's line, the F. Coleman Carriage & Harness Co., Ilion, N. Y., offers two models, one a worm-driven 2-tonner and the other a 3-ton vehicle with final chain drive. Both models follow the same general design except for the final drive, and have their motors under the seats.

Coleman trucks are partly assembled and partly manufactured and are sold principally in upper New York State in the territory surrounding the Ilion plant.

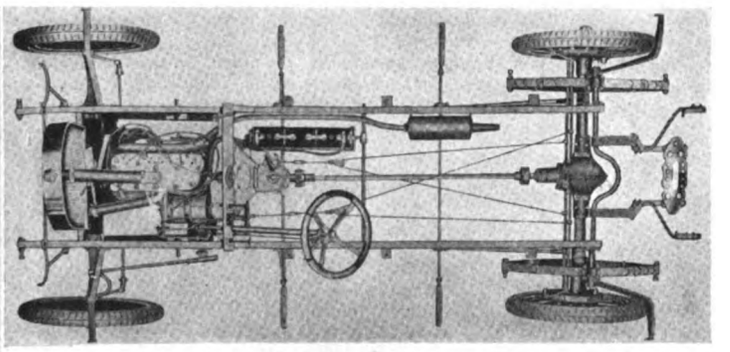
The Coleman company does not indorse the practice of selling its trucks on installments, but will do so when purchased by parties considered reliable. From one-quarter to one-half the selling cost must be paid on order and the balance, with 6 per cent notes negotiable within a year from the date of sale. Coleman trucks are not indorsed for use in connection with trailers.

The 2-tonner has a 4 by 5 motor with a horsepower of 25.60. It drives through a dry-plate clutch and a three-speed selective gearset in a unit power-plant to the worm-driven rear

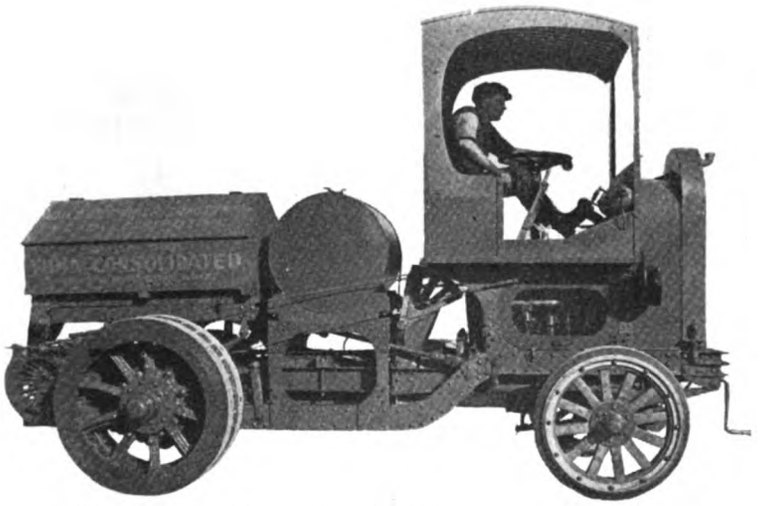
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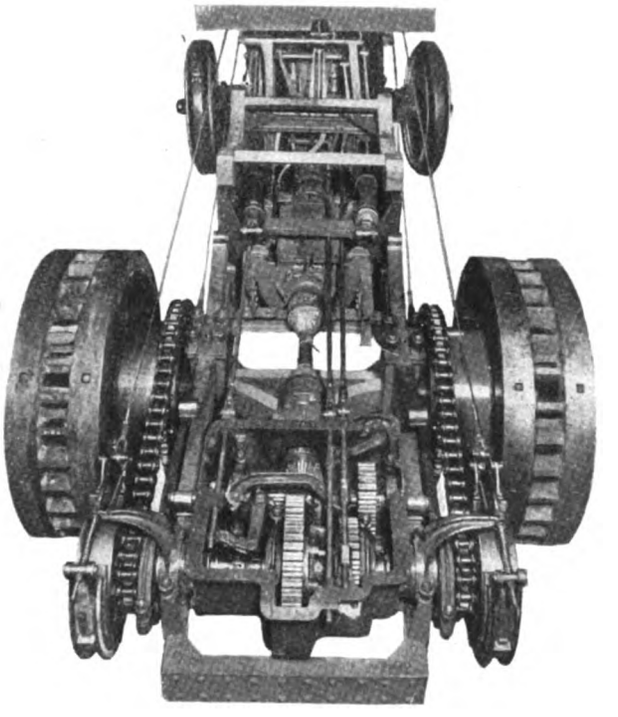
Brown 1000-pound delivery vehicle which is offered with electric lighting and starting as standard equipment. Three different body types are carried in stock for the chassis



Plan view of the Brown 1000-pound chassis, showing the Le Roi unit powerplant, the storage battery, which forms part of the starting and lighting equipment, and the bevel drive



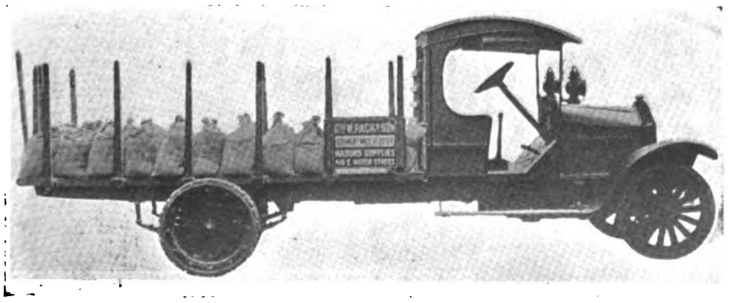
Bulkley-Rider road locomotive with 90 hp. motor and two separate gearsets mounted on spring-supported sub-frame. Final drive is by chain



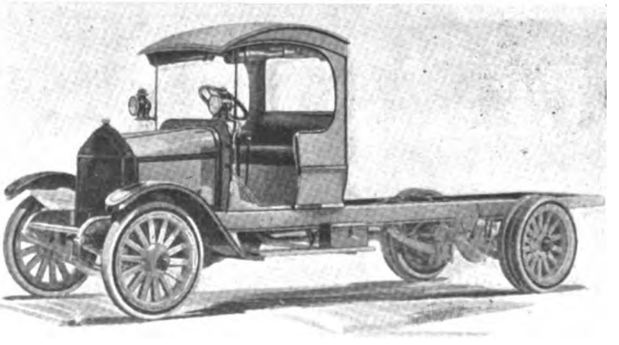
Rear semi-plan view of the Bulkley-Rider tractor, showing the separate chassis and powerplant frames and the two individual gearsets on the latter. That shown amidships is the primary one and that at the extreme rear a reduction unit. These give six speeds forward. Note the driving chains, the jackshaft aft of the rear axle and the wide jackshaft brakes. Notice also the wide steel tires at the rear to which paddle-shaped metal pads may be attached when the tractor must negotiate soft ground



Burford internal-gear-driven 2-tonner with military type of cab in army service abroad. Its price has been raised $250



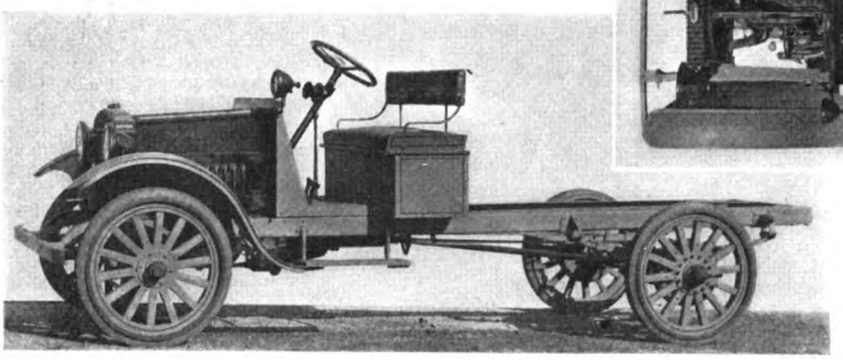
Chase worm-driven 2½-tonner with characteristic cab and hood. It is one of a five-model line from 1 to 3½ tons capacity

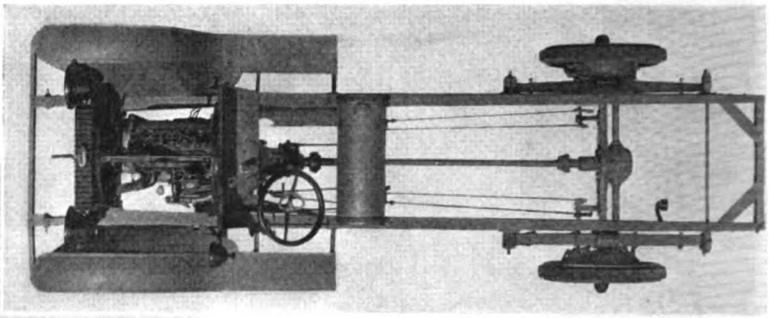


Chase 3-tonner with driver's cab. Note clean chassis lines and the underslung springs at rear with method of mounting

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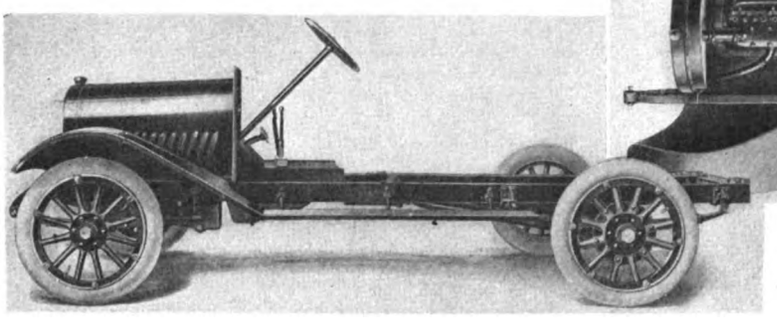
Below is shown the new Commerce 1-tonner in the chassis. It is internal-gear-driven and is sold with electric starting and lighting as standard equipment. It is fitted with a governor driven off the driveshaft

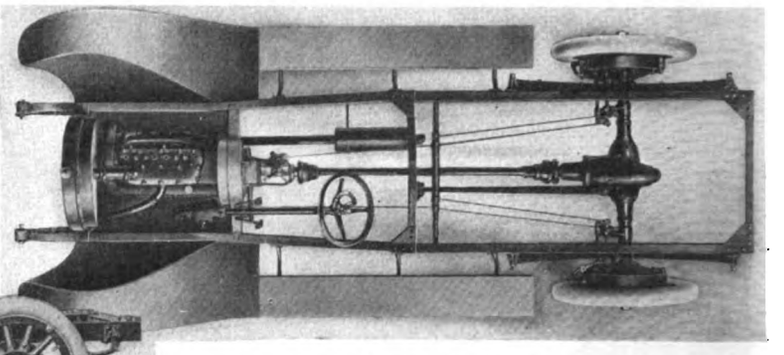




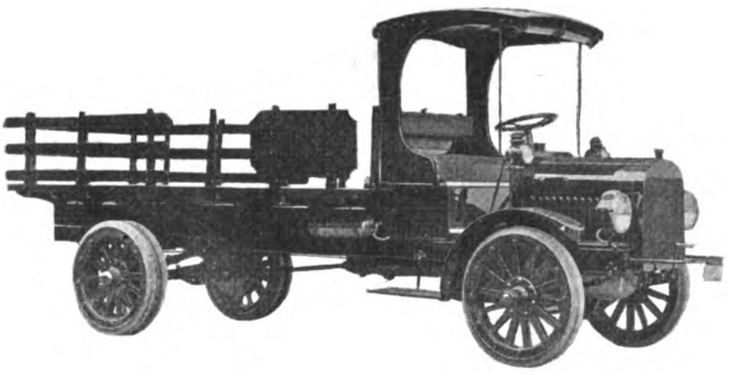
Above, a chassis plan view of the Commerce 1-tonner, showing the cast-case radiator, the unit powerplant, left drive, clean flexible frame and the Torbensen internal-gear-driven rear axle

Below is shown the Collier 1,500-pounder which is bevel-driven and furnished with electric starting and lighting as standard equipment. It has a semi-flexible rolled channel frame and zig-zag-tube radiator





Plan view of the Collier chassis, showing frame, unit powerplant, one-piece driveshaft and torque arm



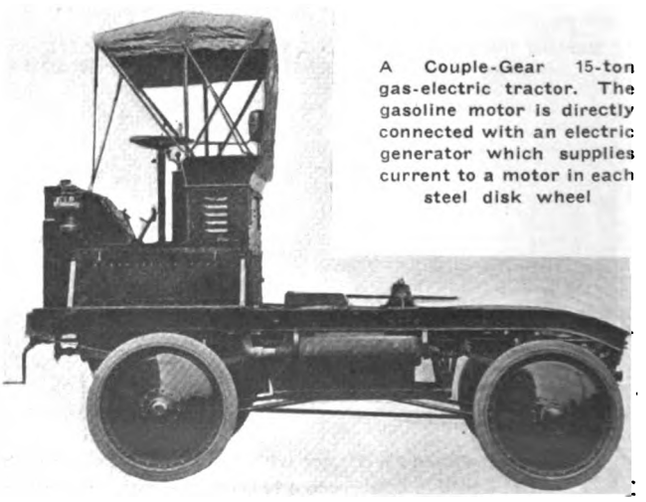
Columbia internal-gear-driven 2-tonner. This is the only size of Columbia truck made and is the same as in 1916



Continental worm-driven 2-tonner, the same as in 1916



Corbitt 1½-tonner which employs final worm drive. It is one of a six-model line from ¾- to 3½-ton capacity. The ¾- and 1-ton models are new for this year



A Couple-Gear 15-ton gas-electric tractor. The gasoline motor is directly connected with an electric generator which supplies current to a motor in each steel disk wheel

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axle. The torque and propulsion are taken through the springs. The 3-tonner has a 4¾ by 5½ motor with a horsepower of 36.15. It drives through a cone clutch to a three-speed selective gearset mounted in a unit with the jackshaft. The speeds of both trucks are limited by centrifugal governors driven from the motors.

Clyde

New 1½-tonner to Be Built on Long Island

CLYDE TRUCKS, designed last year but not yet actively on the market, will be produced in one model of 1½-ton capacity by the Clyde Motor Truck Co., Farmingdale, L. I., N. Y.

It will be an assembled product with internal-gear drive and characterized in outside appearance by a cast-case radiator of circular design with a squared or flat top, and by 2½-in. dual tires on each rear wheel.

The truck will have a four-cylinder motor of 3¾ by 4¼, with a horsepower of 22.50. From the motor the drive is through a wet-plate clutch and a three-speed selective gearset in a unit powerplant. The driving torque and propulsion are taken through the springs. The frame is of pressed steel. Left drive and center control are employed.

Collier

1,500-pounder New in 1916—No Changes

NEW in 1916, the Collier 1,500-pound delivery vehicle, made by the Collier Motor Truck Co., Painesville, Ohio, is continued for 1917 without change in design or price. It is assembled from standard parts and is to be sold throughout the United States. It cannot be purchased on installments from the Collier company, but the latter's agents and dealers may sell Collier trucks on time-payment plans if they so desire. Standard bodies are kept in stock, and the vehicle may be purchased complete if so desired. Electric starting and lighting equipment is furnished as standard.

The vehicle has a semi-flexible rolled-channel frame on which is mounted a 3¼ by 5 motor with a horsepower of 16.92. The motor, dry-plate clutch and three-speed selective gearset are mounted in a unit. The final drive is by bevel gears and a torque-arm is provided for the torque, the propulsion being taken through the springs.

Continental

Design and Prices Remain the Same as in 1916

CONTINUED without change either in design or price, the Continental line, made by the Continental Motor Truck Co., Chicago, consists of four models of from 1 to 3½ tons capacity. All are worm driven and all follow the same general design except for the size of the load-carrying parts. Continental trucks are partly assembled and partly manufactured and are sold mostly in Chicago and the west.

The complete line consists of 1-, 1½-, 2- and 3½-ton models, each of which is worm driven. All have unit powerplants with dry-disk clutches and three-speed selective gearsets. In each case the propulsion and torque are taken through the springs. The motors of the 1- and 1½-tonners are 3¾ and 5¾, with horsepowers of 22.50. Finned-tube radiators with cast cases are used on the two smaller models and cellular cores with cast cases on the larger models.

Corbitt

Four New Models Added to Corbitt Line

FOUR new models have been added to the Corbitt line for 1917 which consists of worm-driven 1-, 1½-, 2-, 2½- and 3½-tonners. It is expected that the prices of all models will be increased approximately 10 per cent when the Corbitt company's present material contracts expire.

The Corbitt Motor Truck Co., has been incorporated with a large capital to take over the former Corbitt Automobile Co., Henderson, N. C., which formerly manufactured Corbitt vehicles. The latter concern began the building of passenger cars 7 years ago and after 3 years commenced the manufacture of trucks. The Corbitt passenger car has now been discontinued, so that the activities of the new concern will be devoted entirely to trucks.

Corbitt commercial vehicles are an assembled product which was formerly sold almost entirely in North Carolina, Virginia, South Carolina and Georgia. It is expected that the new concern will place the 1917 line on the market in the eastern and western states as well as in the south.

Corbitt trucks may be purchased on installments by paying one-half on order and the balance in monthly notes to run for not more than 9 months. Electric lighting and starting are not indorsed by the Corbitt company and not fitted on any of its trucks. No provision is made for the use of Corbitt trucks with trailers unless specified at the time of purchase.

All five models follow the same general design with unit powerplants, with dry-disk clutches and three-speed selective gearsets. The frame of each model is of pressed steel. All are worm driven and take the torque and propulsion through the springs.

Corliss

Bodies Form Integral Part of New ½-tonner

PRESSED-STEEL construction is the outstanding characteristic of the new 1,000-pound Corliss delivery vehicle in which the body forms an integral part of the chassis. The body side and frame proper is pressed out of one piece of 14-gage sheet steel which is prevented from buckling by the application of running-boards and mudguards. The process is patented, and owned by the Corliss Motor Truck Co., Corliss, Wis., which first produced vehicles during the 1916 season.

Two models are offered, both of ½-ton capacity and differing only in the body fitted, one having an open express type and the other a panel design. The frame and body are made by the Corliss company in each case, the motor and other units being purchased outside and assembled.

Corliss trucks are to be sold throughout the United States, and are not offered on any form of time payment due to the small initial investment, $800 buying the complete vehicle. Due to the peculiar frame and body construction, all Corliss models must of necessity be sold complete with bodies. Electric lighting and starting units are furnished at an extra cost.

The engine is located under a small hood in front, and with the dry-plate clutch and three-speed selective gearset constitutes a unit-powerplant suspended at three points. From the gearset the power is delivered to the three-quarter floating rear axle through a shaft with two universals. The springs take the torque and propulsion.

Couple-Gear

8-tonner Added to Line of Gas-electric Tractors

ONE new model of 8 tons capacity has been added to the Couple-Gear offering for 1917, which also includes last year's 3½- and 5-tonners. These have been carried over without major changes except that the motor armatures have been fitted with ball bearings and the price of the smaller model raised $200, from $4,800 to $5,000 and that of the 5-tonner $150, from $5,200 to $5,350.

The principal features of each model are the gas-electric powerplant and four-wheel drive and steer. The Couple-Gear company also manufactures electric trucks of the same general construction except that the current is obtained from storage batteries instead of from generators driven by gasoline motors.

Couple-Gear trucks are mostly assembled products sold principally in New England, New York, and to a lesser extent in the south and west. They are not sold on any form of time payments.

Standard bodies are provided by the Couple-Gear company, about half of its trucks being sold complete with bodies.

The 3½-ton unit differs from the 5- and 8-tonners in that it is a self-contained truck while the two larger sizes are tractors designed to support the front ends of semi-trailers. All three models follow the same general design. The gasoline motors drive direct-connected electric generators. These are carried on sub-frames in units with the gasoline motors, the sub-frames being supported from the main frames of each unit at three points.

Final drive is by small electric motors inclosed within each of the steel disk wheels. The motor armature shafts are vertical and have bevel pinions on each end which drive the wheels through internal bevel teeth on the wheel felloes.

An electric lighting unit is furnished as standard equipment on each model and a Couple-Gear starter is provided, if ordered, at an extra charge of $150.

Crawford

3-ton Chain Unit Continued as 1917 Offering

MARYLAND-MADE, the Crawford truck, produced by the Crawford Automobile Co., Hagerstown, Md., is continued from last year without change. It is produced in but one model, a 3-ton chain-driven unit.

The Crawford truck is an assembled product and one of the very few motor trucks manufactured in the State of Maryland. It is sold almost entirely in that State or locally to its place of manufacture.

The truck follows conventional design with its motor under a hood, a 144-in. wheelbase and double-chain drive from a jackshaft and gearset mounted independently amidships. The motor is 4½ by 5½, with cylinders cast in pairs and the valves to the left with dual ignition. The motor is fitted with a suction-type governor set to limit the truck speed to 15 miles per hour at a motor speed of 2,000 r.p.m. The same sized tires are used both front and rear, 37 by 4, those in the rear being dual.

Croce

Croce Unchanged Line Made Up of Three Models

CROCE trucks, made by the Croce Automobile Co., Asbury Park, N. J., are carried over for 1916 without change in design or price. The line consists of a ½-ton bevel-driven delivery vehicle and worm-driven trucks of 1½- and 2½-ton capacity.

The Croce company has offered the same line as that for

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1917 since 1915 except that in that year the final drive of the 1½- and 2½-tonners was changed from chain to worm and the 3½- and 5-ton chain-driven models discontinued. The 1½-tonner has always been driven by bevel gears.

Adhering to Croce precedent, the motors of the two largest 1917 units are placed between the seats. The motor of the smallest model is placed forward of the dash under a conventional hood. Another feature in which the Croce vehicles differ from others is in the use of Cupids' bow springs instead of the purely semi-elliptic type.

Croce trucks are partially assembled products which are sold sectionally in the East.

The ½-tonner is equipped with 3¼ by 5 motor developing 16.92 rated horsepower. From the motor the drive is through a dry-disk clutch and a three-speed selective gearset mounted in a unit with the motor. Final drive is by bevel with the torque and propulsion taken through the springs.

Crowther-Duryea

Crowther and Duryea Combine on Roller Drive

CHARACTERIZED by its final roller drive, the patent of Charles E. Duryea, the Crowther-Duryea 1,200-pound delivery vehicle, last year known as the Crowther, is continued for this year without change in design or price. The vehicle is made by the Crowther Motor Corp., Rochester, N. Y., for department store and package delivery work. It differs from previous vehicles designed by Duryea in that it is equipped with a four-cylinder motor of the four-cycle type, under a hood forward of the dash, instead of a two-cycle type under the body. The latter type of vehicle was offered on the market last year by the Duryea Laboratories, Philadelphia, Pa., but has been discontinued for this year and all energies put forward on the Crowther-Duryea. Duryea was closely identified with both the Philadelphia and Rochester concerns.

The Crowther-Duryea is partly assembled and partly manufactured and is sold mostly in the East. The motor is 3¾ by 4¼, with a horsepower of 22.50. The drive from the motor is by shaft to a jackshaft just forward of the rear axle. On each end of the jackshaft are positioned a set of rollers which contact with either one of two grooved circular rings of different diameter bolted to the rear wheel spokes. Moving either one of the two jackshaft rollers into contact with the ring of larger diameter gives the changes in forward speeds. Similarly, moving the smaller roller into contact with the ring of smaller diameter gives the reverse speed. The vehicle is equipped with electric starting and lighting as standard units.

D-E

New 1½-ton Model Added to Two 1916 Sizes

MAKING THEIR DEBUT early in 1916, D-E trucks, made by the Day-Elder Motors Co., Newark, N. J., have been increased one model in number by the addition of a new 1½-tonner for the 1917 market. The two smaller sizes are worm driven, one of 1,250 pounds' capacity and the other of 1-ton burden. Each embodies the same structural features.

The price of each of the two smaller models has been increased, the 1,250-pounder $80, from $895 to $975 and the 1-ton size $50, from $1,450 to $1,500.

They are an assembled product sold mainly in the East at the present time. They may be purchased on installments by an initial payment of 25 per cent and the balance within 1 year.

Standard bodies are provided for both chassis and approximately 50 per cent of the trucks sold are equipped with bodies. Electric starting and lighting are indorsed and furnished as extra equipment at $85. Provision is made in the two heavier models for use in connection with trailers.

Both of the smaller models follow the same general design except for the load-carrying parts. Each has a pressed steel frame of the rigid type, a unit power plant with a dry-disk clutch and a three-speed selective gearset, and a vacuum gasoline feed system. Driving torque and propulsion are taken through the springs in each case.

Crown

No Changes Are Made In Three Crown Models

SUBSTANTIALLY the same vehicles as offered in 1915, the 1917 line of Crown trucks, made by the Crown Commercial Car Co., North Milwaukee, Wis., consists of three models of ¾-, 1½- and 2½-ton capacity. All three units are worm driven.

The absence of changes since 1915, and even for a portion of 1914, is due to advanced construction adopted at that time when the Crown was the only American commercial vehicle which embodied a flexible pressed-steel frame, steel wheels, worm drive with the torque and propulsion taken through the springs and with a cast-case, finned-tube radiator, and left steer and center control.

The vehicles before 1914 were chain driven, with their motors under the floors but were changed to the type outlined above in that year and included, in addition, a four-speed gearbox, single ignition and a block-cast motor and gearset in a unit powerplant mounted on a separate sub-frame in the lighter model.

The present 1,500-pounder was new in 1915, and differs from the other models in that it embodies a passenger-car type of radiator, wood wheels and pneumatic tires. All three models are assembled from standard parts and are sold principally in the Middle West.

Dart

2-tonner Dropped — Now a Three-model Line

DROPPING its 2-tonner and increasing the capacity of its 1-tonner to 1½ tons, the Dart line, made by the Dart Motor Truck Co., Waterloo, Iowa, consists of three models, a 1,500-pounder and a 2½-tonner being carried in addition to the 3,000-pounder mentioned. All three models are worm driven.

The price of the ¾-tonner has been reduced $100 from last year's price or from $1,300 to $1,200. It also has a selective instead of a progressive gearbox, a larger gear reduction and is fitted with a vacuum feed gasoline system.

The price of the 1½-tonner has been increased $50 or from $1,800 as given in the November 1, 1916, issue of THE COMMERCIAL VEHICLE, to $1,850. It is fitted with a Duplex governor, vacuum gasoline feed system and a bumper.

Slight changes have been made in the 2½-ton model including an option between three-or four-speed selective gearsets and 36 by 7 in. single tires at the rear instead of 36 by 4 duals. Like the 1½-tonner, it is equipped with a Duplex governor, vacuum gasoline feed system and a bumper.

Dart trucks are assembled from standard parts only. They are marketed throughout the United States and also abroad. They may be purchased on a time-payment plan in which one-third of the selling price is paid in cash on order and the balance in ten equal monthly payments covered by a chattel mortgage and a fire insurance policy on the chassis.

Electric lighting and starting units are not furnished on any of the models. Dart trucks are indorsed for use in connection with trailers when the loads are light or bulky.

All three models follow the same general design employing pressed steel frames, dry-disk clutches and gearsets in units with the motors, and take the torque and propulsion through the springs.

Dain

No Changes in 1-tonner with Friction Drive

DIFFERING from trucks of conventional design, the 1-ton Dain, made by the Dain Mfg. Co., Ottumwa, Iowa, has a special friction change-gear which transmits the power to a worm-driven rear axle. The vehicle is continued from 1916 with practically no changes except those of minor refinement.

The change-gear consists of a cone clutch in the flywheel of the motor with the cone member keyed to the propeller shaft so that the member can be slid backward and forward along the shaft. The flywheel bears against two paper-tired friction disks at its rear which in turn drive the paper-tired cone. The disks are set obliquely to the horizontal, slanting toward each other at the bottom.

Direct drive is secured by moving the cone member in contact with the flywheel, as ordinarily. For low, intermediate and reverse speeds, it is withdrawn and the wheel slid across the faces of the disks.

The Dain is largely a manufactured truck and is sold principally in Iowa and the adjacent states.

Dayton

Worm Driver Added to Line of Four Chain Models

ONE MODEL of 3½ tons' capacity with final worm drive has been added to the Dayton line of 2-, 3½-, 5- and 7½-ton chain-driven trucks manufactured by the Durable Dayton Truck Co., Dayton, Ohio. The prices of all models have been continued without change. There have been some few minor changes in design. The radiators of all of last year's models have been changed from finned-tube cores and cast cases to square tubes in cast cases and the four-speed gearboxes on the 5- and 7-ton models to three-speed types.

Dayton trucks are partly assembled and partly manufactured. They are sold nationally and abroad and may be purchased on installments when the covering notes are indorsed by reputable concerns. They are also guaranteed for use with trailers.

All five models follow the same general design and are characterized by having their motors under the seats. All have rolled-channel frames, dual ignition and hand spark advance.

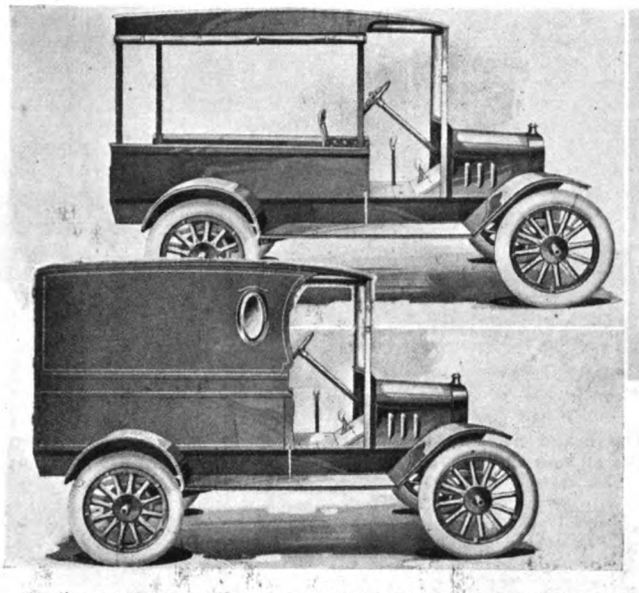
De Kalb

Two Worm-driven Models— One New in 1917

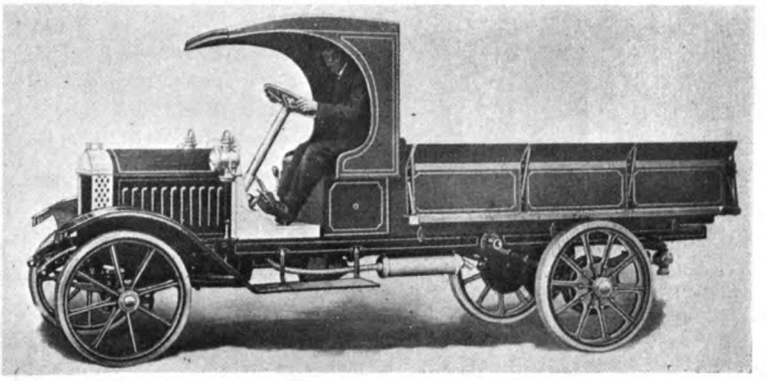
REPLACING one model by another of larger capacity, but of the same general dimensions, the De Kalb line, made by the De Kalb Wagon Wks. Co., De Kalb, Ill., consists of two models of 2 and 2½ tons' capacity. The 2-ton model is new, and replaces the 1½-tonner of last year, selling for $2,100, $150 more than the 1½-ton model. The 2½-ton model is priced the same, at $2,450.

Last year the final drive was optional, but this year both

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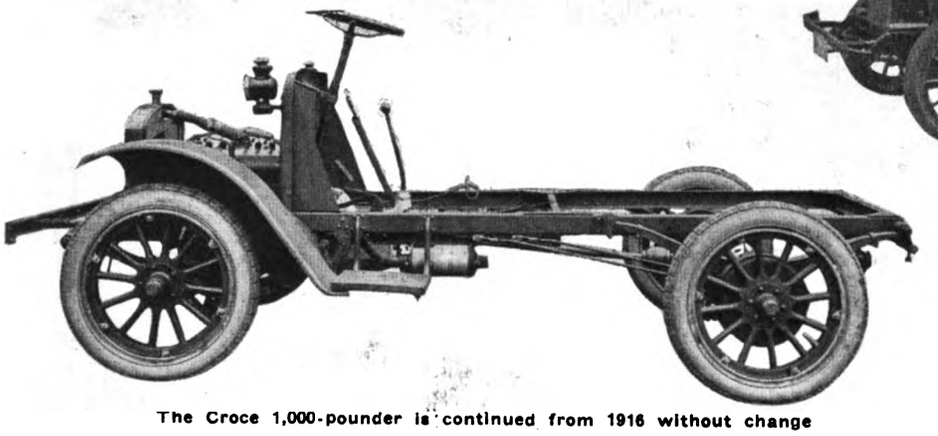


Corliss 1,000-pounder sold complete with two types of pressed steel bodies forming integral part of chassis



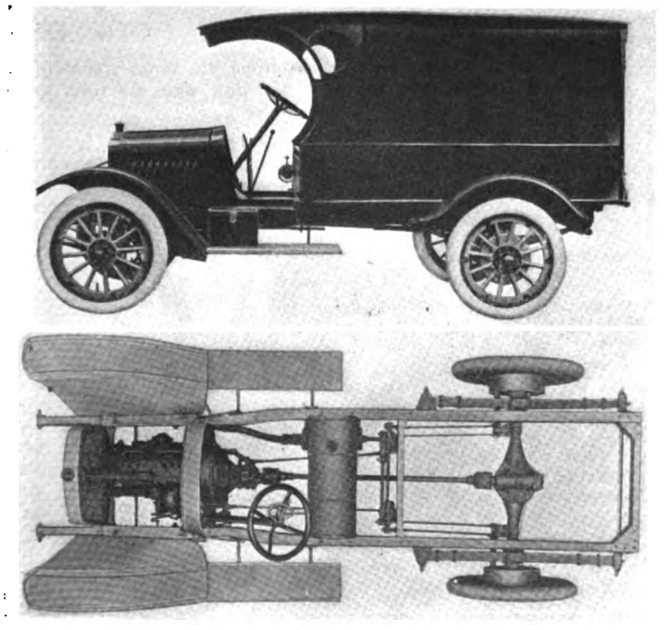
Crown worm-driven 1½-tonner which is equipped with steel wheels and flexible frame



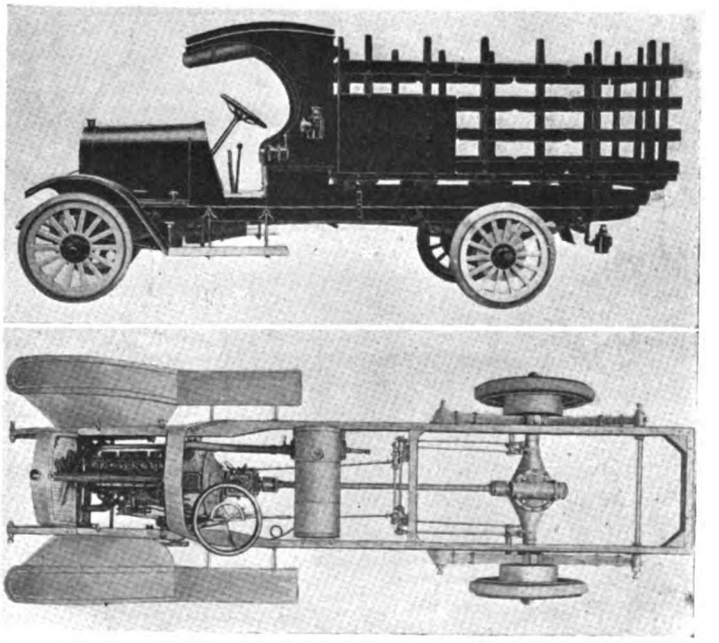


The Croce 1,000-pounder is continued from 1916 without change

Croce 1,000-pound delivery vehicle in the chassis at the left and with body above. It has a unit powerplant and bevel final drive. Note the long low body in the view above and the Cupid's bow springs in that to the left. Note the sheet-metal dash

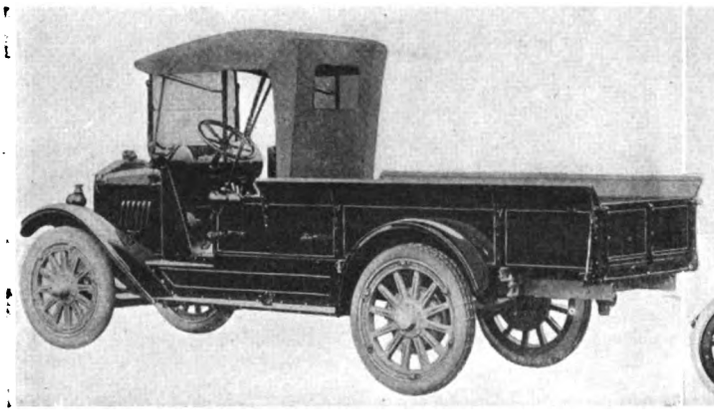


D-E 1,250-pound model with body and as seen from above in the chassis. Note the unit powerplant, left drive, one-piece driveshaft, gas tank location and worm drive

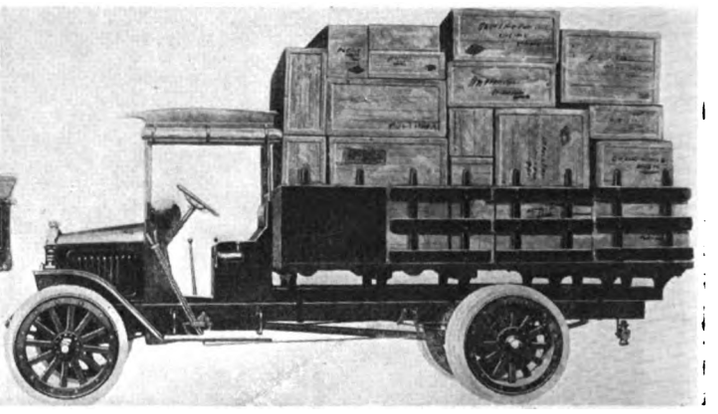


D-E 1-tonner which is very similar to the smaller model on the left. It too has a unit powerplant and final worm drive and is equipped with solids instead of pneumatics

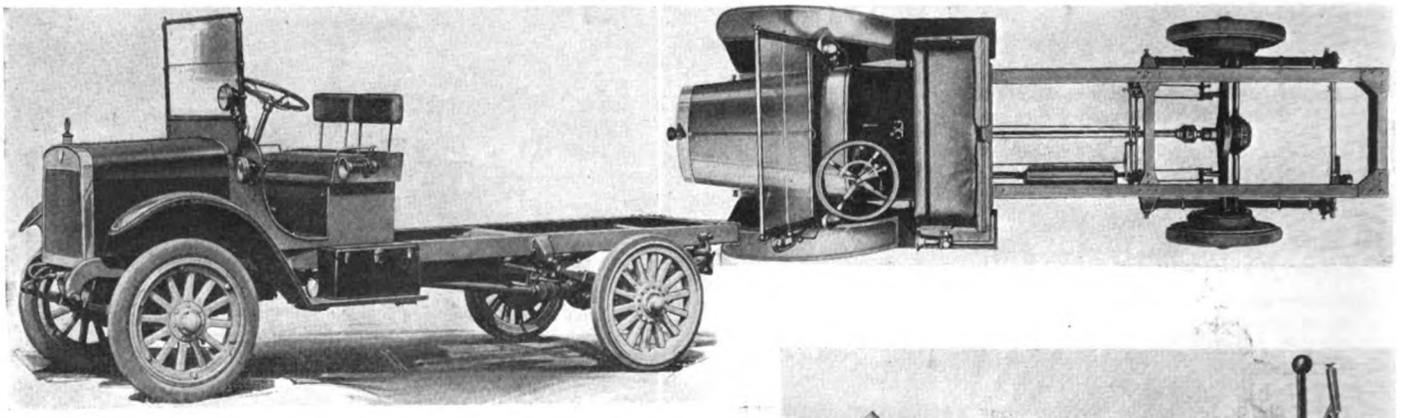
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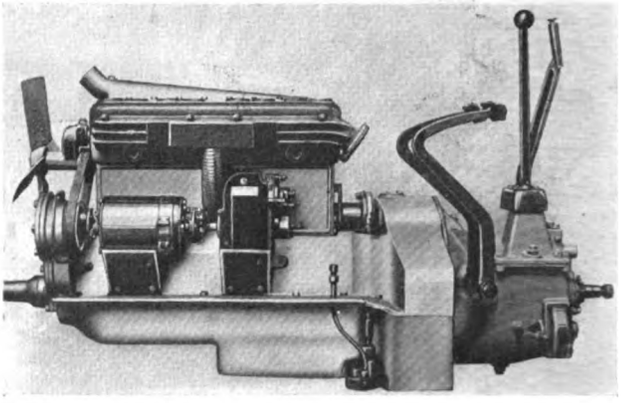
The 1-ton internal-gear-driven Denby whose price has been reduced from $1,475 to $1,020. Shown with standard body and cab



The brand new 2½-ton Denby which is internal-gear-driven like all four of the Denby models. Note the dash gasoline tank

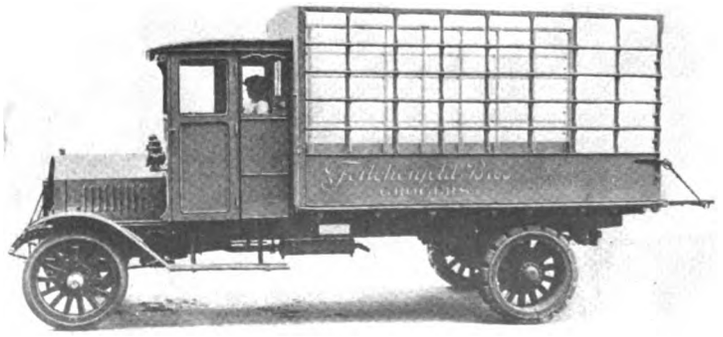


Side and plan chassis views of the Denmo 1¼-tonner, a new truck in 1916. It is equipped with pneumatics in front and solids in the rear and employs internal-gear drive with a Torbensen axle

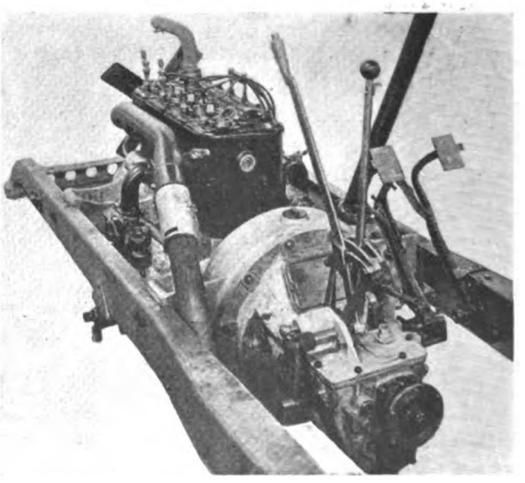


Unit powerplant used on the Denmo 1¼ tonner, showing the installation of the two-unit lighting and starting system employed





At the top, Diamond-T 1-tonner with pneumatics in front for speed. Directly above, the Diamond-T 3½-tonner with worm drive



Typical unit powerplant of the four smaller Diamond-T trucks, showing the compact grouping of the control members

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models have worm-gear drive. The powerplant is now a unit with the engine, instead of amidships as formerly, the 2-tonner having a cone clutch, and the 2½-tonner a dry-disk type. Last year each had a dry-disk clutch.

De Kalb trucks are an assembled product, sold chiefly in Illinois, Iowa and Wisconsin, and may be purchased on a monthly installment basis, providing a substantial cash payment is made when the order is placed.

The standard wheelbase of the smaller model is 134 in., that of the larger 136 in., but this may be changed to suit the requirements of the purchaser, if desired. The De Kalb company does not indorse the use of electric starters but holds to its guarantee when trailers are used.

Doane

New 2½-ton Low-bed Unit Added to Line

ONE NEW MODEL of 2½-ton capacity has been added to the Doane line, made by the Doane Motor Truck Co., San Francisco, Cal. It follows last year's 6-tonner in design and is characterized by an especially low load platform, secured by the use of a dropped frame and cranked axles. Both models are sold complete with bodies, the price of the 6-tonner remaining the same as in 1916.

The Doane loading platform is as low as those of horse wagons used on the Pacific coast, and to replace which the Doane truck was designed.

It is a manufactured product sold principally in California. It may be bought on installments when one-fourth the purchase price is paid in cash and the balance within 1 year. Doane trucks are sold complete with standard bodies. Electric lighting and starting are not indorsed by the Doane company and are not fitted on any of its vehicles. The use of trailers in connection with Doane trucks is not indorsed, except in special cases where the loads are bulky.

Both models follow the same general design, each being equipped with a unit power plant, dry-disk clutch and three-speed selective gearset. The 2½-tonner has a 4¼ by 5¾ motor, rated at 29.00 hp., and the 6-tonner, a 4¾ by 6¾ motor, rated at 36.15 hp. Double chain final drive, right steer and center control are used on each model.

Denby

Four Models—Reduced Prices and a New Unit

INCREASE in load capacity rating of all models with corresponding increase in prices for 1917, characterize the Denby line, made by the Denby Motor Truck Co., Detroit. The price of the 1-ton model accordingly is dropped from $1,475 to $1,020; the 1½-ton from $1,685 to $1,575 and the 2-ton from $1,985 to $1,790. The ¾-ton rating is dropped, and a 2½-ton size added that is entirely new, selling for $2,090.

Few improvements have been made, comprising only an increase in tire size, heavier springs and minor refinements. throughout. The specifications of the new models are practically the same as those for 1916, except for the increased strength necessitated by the larger capacity.

With the exception of the frame, Denby trucks are assembled from standard parts made by specialists. They are sold through city and county agencies, both at home and abroad, being known abroad as the Whiting-Denby. They may be bought on a time-payment plan of 25 per cent down, and the balance in twelve monthly installments.

Standard bodies are supplied for all chassis, and special bodies will be furnished when desired. Though not part of the stock equipment, Gray & Davis lighting systems and an Allis-Chalmers starting system will be installed when specified.

The use of trailers is not only indorsed, but strongly advised by the Denby company.

Duplex

Four-wheel Drive Truck in Three Models

CONTINUED FROM last year with slight changes in design the Duplex line, made by the Duplex Truck Co., Lansing, Mich., consists of three models of 2-, 3- and 3½-ton capacity, all of which are characterized by four-wheel drive. Prices have been changed, that of the 3-tonner being decreased $100, that of the 3½-ton unit increased $300 and that of the 2-tonner remaining constant at $2800. The 2-ton vehicle, which was last year provided with an 8-speed gearset, with two reverse speeds, is now furnished with a six-speed unit.

Duplex trucks are partly assembled and partly manufactured and are sold throughout the United States. All three models follow the same general design. The drive is from the clutch and gearset in a unit with the motor to a point amidships, where gears transmit it to driveshafts which extend forward and aft to internal-gear-driven front and rear axles. The motor of the 3-tonner is 4½ by 5, with a rated hp. of 32.40. A finned-tube radiator, with sheet-metal case, is employed. Electric starting and lighting equipment may be had at an extra cost of $150. A vacuum feed gasoline system is also furnished as standard equipment.

Denmo

New 1¼-tonner—Electric Equipment Featured

ELECTRIC lighting and starting, internal-gear drive, and the combination of pneumatic front tires with solid rears, are features of the new Denmo 1¼-ton truck, made by the Denneen Motor Co., Cleveland, Ohio, and first brought out late in 1916.

In design the truck follows standard practice, and is assembled from well-known units, having a Wisconsin engine that forms a unit with the Borg & Beck dry-plate clutch, and three-speed selective gearbox. Final drive is through a Torbensen internal gear-driven rear axle, with Hotchkiss type drive.

Electric starting and lighting is effected by a Splitdorf-Apple two-unit system, both units being mounted on the left side of the engine. Particular care has been taken in the installation of the storage battery, as a specially designed spring cradle has been provided to prevent injury from road shocks. This battery supplies current only for the starting and lighting system, the ignition current being provided separately by a Dixie magneto.

Dispatch

One Model Is Electrically Equipped

CONCENTRATING on one model of 1,200 lb. capacity, the Dispatch truck, made by the Dispatch Motor Car Co., Minneapolis, Minn., is practically unchanged, except that the U. S. L. starting and lighting system is now stock equipment. The price has increased $250 in the past year, and has been necessitated by the addition of the electric system and several refinements in construction that have bettered the interchangeability and ease of replacement of parts.

With the exception of the engine and the electric system, the truck is manufactured in the company's own plant. It is sold in thirty States and the Dispatch company has representatives in Canada and England.

All trucks are equipped with standard bodies, and the use of trailers is indorsed, but no provision made for their use.

Mechanically, the truck is characterized by a friction change gear, incorporated with the jackshaft, and mounted amidships. Final drive is through double chains, inclosed in metal housings at each side.

Dominion

No Changes Made in 6-ton Worm-driven Tractor

CLOSE-COUPLED, with its motor between the seats and final worm-drive, the Dominion tractor, made by the Dominion Motor Truck Co., Detroit, is continued for 1917 without change in design or price. The Dominion company was originally located in Canada, but moved its plant to Detroit in 1915 and brought out its first stock model of the Dominion gasoline tractor at that time.

The Dominion vehicle is an assembled product which at the present time is sold locally to Detroit and across the border in Canada. The wheelbase of the Dominion vehicle is but 90 inches. It has a 4¾ by 5½ motor, with cylinders cast in pairs and the valves opposite. A unit powerplant with a dry-disk clutch and three-speed selective gearset is employed. Both the driving torque and the propulsion are taken through the springs. Left steer is adhered to.

Dorris

¾-tonner Dropped—Price of 2-ton Raised

DROPPING ITS ¾-ton model, the Dorris line, made by the Dorris Motor Car Co., St. Louis, Mo., will consist of one 2-ton model for 1917. This model has been carried over from last year without change in design. Its price, however, has been increased from $1990 to $2185.

The Dorris company has manufactured passenger cars for more than a decade and has manufactured ¾- and 2-ton models since 1911. Up until 1916 both trucks were practically the same from year to year, with the exception of minor refinements and a change from chain to worm drive on the 1916 2-tonner.

Dorris trucks are partly manufactured and partly assembled and are sold principally in the western and Pacific states. The 2-ton model is worm-driven and takes the driving torque and propulsion through its springs. It has a semi-flexible pressed steel frame, on which is mounted a unit powerplant consisting of a 4⅜ by 5 valve-in-the-head motor, a dry-disk clutch and a three-speed selective gearset. Left drive and center control are employed.

Diamond-T

Five Models—One Dropped and Two Added

WITH the exception of the discontinuation of the ¾-tonner, and the addition of 1- and 5-ton models, the Diamond-T line, made by the Diamond-T Motor Car Co., Chicago, remains unchanged. The prices of the 1½-ton model have been decreased from $2,050 to $1,900; the 2-ton and 2¾-ton prices are the same; the new 1-tonner sells for $1,485 and the new 5-tonner for $4,100.

The Diamond-T company built passenger cars and trucks nine years ago, and is said to have been the first to put a 1½-ton worm-driven truck on the American market. The design of this model is practically unchanged to-day.

These trucks are assembled from standard parts and are

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supplied with standard bodies, although about 50 per cent are sold stripped. A time-payment proposition is extended to the purchaser providing he lives in the Chicago district. During the past year the company has extended its territory from Chicago and its environs, and is now supplying trucks throughout the country.

The installation of a starting and lighting system is optional with the purchaser, but not indorsed by the maker. For $75 extra the Vesta lighting system will be supplied, and for starting and lighting, the Westinghouse system, at $125.

Trailers are indorsed, but no provision made for their use.

Ellsworth

1000-pounder Continued for 1917

SOLD COMPLETELY equipped with body and an electric starting and lighting system, the Ellsworth 1000-pounder is continued without change, either in price or design. The vehicle is made by the Mills-Ellsworth Co., Keokuk, Iowa, and is offered complete with either an express body with a fixed top or a panel design. The chassis sells for $635. When equipped with the express body the price is $695 and $720 with the panel type. The latter body is made of steel. The Ellsworth delivery vehicle is an assembled product which was first produced in 1916 and which is to be sold throughout the United States.

The vehicle is equipped with a unit powerplant consisting of a 3¼ by 5 motor, cone clutch and three-speed selective gearset. The final drive is by bevel, the driving torque being taken by a torsion tube and the propulsion by the springs. The frame is of pressed steel of the flexible type and is carried on pneumatics of the same size in both front and rear.

Federal

Five Models Offered—All Worm-driven

THREE NEW models have been added to the Federal line during the past year, a new 2-tonner being brought out in April, 1916, and two brand new units of 1- and 5-ton capacity offered for this year. The complete line consists of 1-, 1½-, 2-, 3- and 5-ton trucks, each of which employs final worm drive. The Federal company is changing to Hercules motors on all models and is planning to manufacture its own gearsets.

Federal trucks are an assembled product, with the exception of a few minor parts made in the Federal factory. They are sold in every state of the Union and also abroad, being known in England as the Whiting-Federal. The Federal company does not sell its trucks on any form of time payments, although many of its dealers employ such plans and sell many Federal trucks in that manner. Electric lighting and starting equipment is furnished on all models at an extra charge.

All Federal units follow the same general design, employing final worm drive, in which the torque is taken by the springs and the propulsion by radius rods. Selective gearsets mounted amidships are used in each case, except that of the 3½-tonner, in which it is in a unit with the motor. All the gearsets are of the three-speed type, except that fitted on the 5-ton model, which has four speeds. Dry-plate clutches are used on the 1- and 5-ton models, a dry-disk on the 3½-tonner and a cone type on the 1½- and 2-tonners. All frames are of the semi-flexible type. Those of the 1-, 1½- and 2-ton units are made of pressed steel and those on the 3½- and 5-tonners of rolled channel stock. Finned-tube radiators with sheet cases are fitted on the new 1- and 5-ton models. A finned-tube type with a cast case is used on the 3½-tonner and cellular cores with cast casings on the 1½- and 2-tonners.

Fargo

1-tonner Dropped—Price of 2-ton Decreased

SPECIALIZING ON but one model for 1917, the Fargo Motor Car Co., Chicago, has dropped its 1-ton model but continues its 2-tonner without change in design. Its price has been decreased from $1575 to $1390.

The Fargo 2-tonner is an internal-gear-driven truck, assembled from standard parts and sold mostly in Chicago and its vicinity. It may be purchased on time payments by responsible buyers. An initial payment of 25 per cent is required in each case and the balance in equal monthly installments within 1 year of the date of sale.

Fargo trucks are generally sold complete with body. An electric starting and lighting system is furnished as extra equipment. The vehicle is featured by the use of a three-speed progressive gearset in a unit, with a dry-disk clutch and a motor 4⅛ by 5½. A finned-tube radiator with a sheet casing is employed. The torque and propulsion are taken through the springs.

F. W. D.

One Model Continued—Two Dropped

CONTINUING all its models, the Four Wheel Drive Auto Co., Clintonville, Wis., is offering its 1½-, 3- and 5-ton vehicles offered in 1916. The units carried over are unchanged in design or price. As the name implies, the truck is mainly characterized by its bevel four-wheel drive.

F. W. D. trucks are partly assembled and partly manufactured and are sold in this country generally and also abroad. Several fleets of F. W. D. vehicles with the United States expeditionary forces in Mexico made especially enviable records.

Although F. W. D. trucks are supplied mainly as chassis, the F. W. D. company carries three styles of standard bodies in stock and will furnish these when ordered. Special types can also be had from the company to suit the special needs of any purchaser.

The 3-ton model is fitted with a 4¾ by 5½ motor, with the cylinders cast in pairs and the valves placed opposite each other. From the motor, which is under the seats, the drive is taken to a special three-speed individual-clutch gearset mounted amidships. This consists of the ordinary gearset with its main shaft extended and driving by a silent chain a differential mounted in the same casing. From both sides of the differential extend the propeller shafts, one to the front axle and the other to the rear. There is a jaw clutch between each shaft and the differential. Locking levers for these clutches extend outside of the differential casing and are provided with handles so that the driver may lock either one or both of the clutches, thereby marking the truck front- or rear-wheel driven or four-wheel driven at will.

The differential in the gearset housing differentiates between the front and rear axles, each of which is bevel driven and equipped with a differential of its own to compensate for the different speeds of the two wheels on each axle, as when rounding corners. Although both axles take the drive, only the front one is used for steering, the wheels being carried on ball joints through which the drive is transmitted by means of universals.

Gabriel

Three Models Carried Over Without Change

NO CHANGES have been made in Gabriel trucks for 1917. They are made by the Gabriel Auto Co., Cleveland, Ohio, and are offered in ¾-, 1- and 1½-ton sizes, the smaller model being bevel driven and the other two employing worm drive.

Gabriel trucks are partly-assembled products which are sold principally in Ohio. They can be furnished with standard bodies and also with electric starting and lighting units as extra equipment at additional cost. They are guaranteed for use with light-capacity trailers.

Each model follows the same general design except for the final drive and each is equipped with the same sized motor, a 4⅛ by 5½, with a rated horsepower of 27.20. From the motor the drive is taken through a cone clutch in each case to a selective gearset mounted amidships. The gearset of the ¾-tonner has three speeds and those of the other two models four speeds. The 1,500-pounder takes its propulsion through the springs and its torque through a torque arm. The two larger models take both the torque and the propulsion through the springs. Left steer and center control are employed on each model.

Forschler

Double Frames Continued in New Models

DOUBLE FRAMES are the feature of Forschler trucks, made by the Forschler Motor Truck Mfg. Co., the new company reorganized during 1916 from the Forschler Wagon Co., New Orleans, La. They are offered in brand new models for 1917 which differ from those produced for 1916 in that the former double-chain drive has been replaced by worm drive and the capacities changed from 1½ and 3 tons to 1 and 2 tons.

Both models follow the same general design and are assembled from standard parts. They are offered for sale mainly in Louisiana and the South and may be purchased on a time-payment plan, which includes one-third the price in cash and the balance in 6 per cent monthly notes expiring within 1 year.

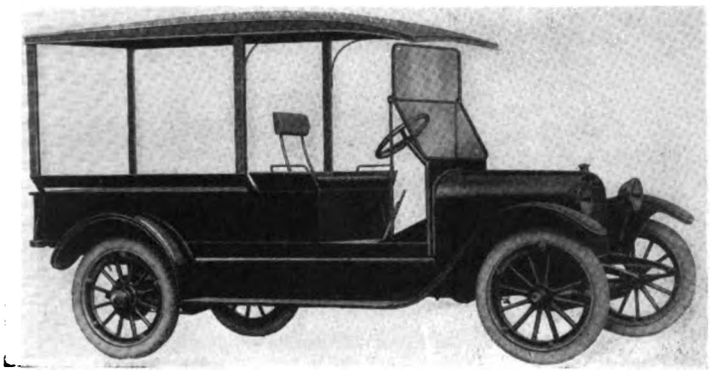
Each model employs a flexible frame made of rolled channel section on which is mounted a unit powerplant comprising a 3½ by 5 motor in the case of the 1-tonner and a 4⅛ by 5¼ in the 2-ton size, together with a dry-plate clutch and a three-speed selective gearset. The final drive is by worm and the driving torque and propulsion are taken through the springs. Square-tube radiators with sheet casings are employed. Left steer and center control are used on each model. No electric lighting or starting systems are included as standard equipment. The use of trailers is indorsed and provided for.

Garford

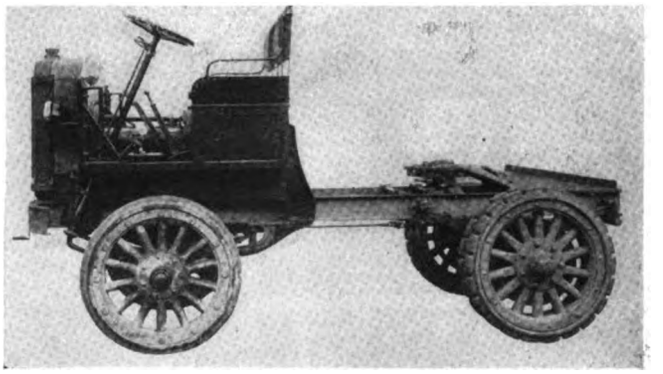
3½-ton Worm Added—Six Models in Line

ADDING A NEW 3½-ton worm-driven model during 1916 and dropping its old 1,500-pound chain-driven vehicle, the Garford Motor Truck Co., Lima, Ohio, offers a line of six models for 1917. All of the vehicles except the 3½-tonner are carried over from last year without change in price and with but few minor changes in design. The complete line consists of worm-driven 1-, 1½-, 2- and 3½-tonners and 5- and 6-ton chain-driven vehicles. All of the worm-driven sizes except the 3½-tonner have their motors under hoods with steel Roman dashes and the chain drivers have their motors between the seats. The 3½-ton truck has its motor similarly placed, a depar-

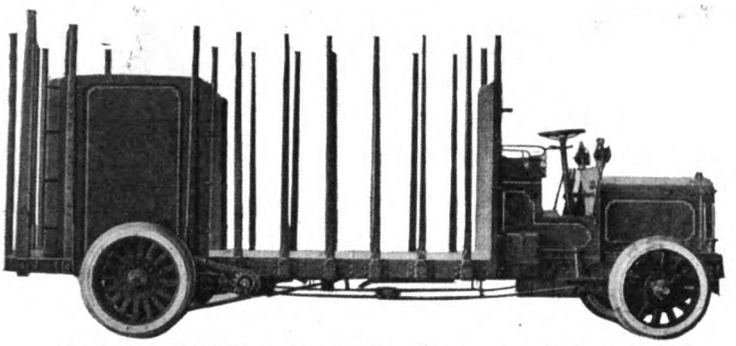
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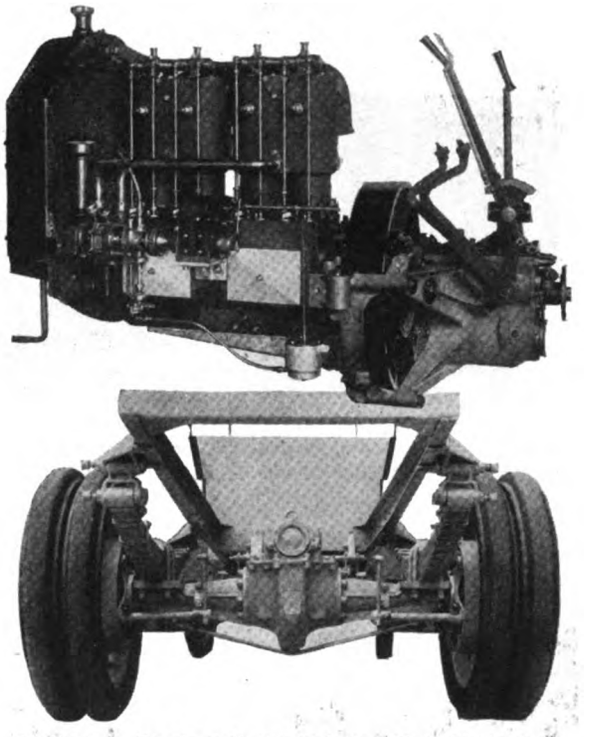
Detroit 1,000-pound package delivery vehicle which is furnished with electric starting and lighting as standard equipment



Dominion four-wheeled tractor characterized by its short wheelbase, motor between the seats and final worm drive



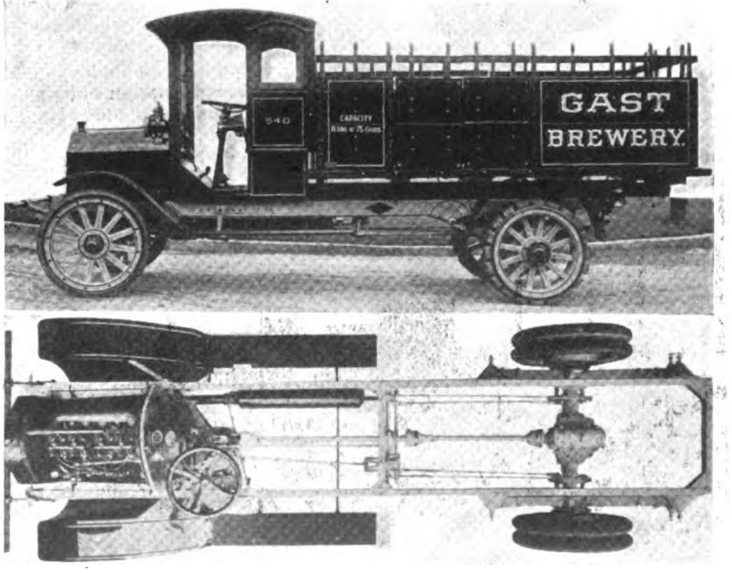
Doane low-bed 6-tonner, a Pacific coast product sold principally in California. It has a trussed frame and cranked axles to provide for the low loading platform

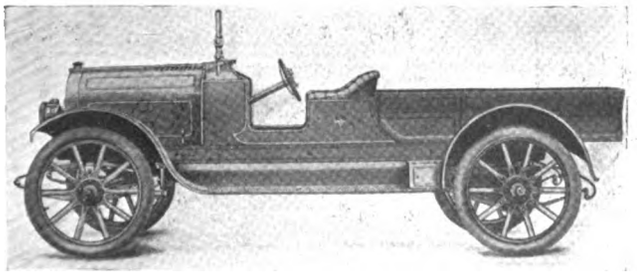


At the top, Dorris unit powerplant with valve-in-the-head motor. Rear of Dorris 2-tonner directly above



Duplex 3-tonner, characterized by its four-wheel internal-gear drive and a six-speed gearset. The drive is by shafts from a point amidships to each of the front and rear axles

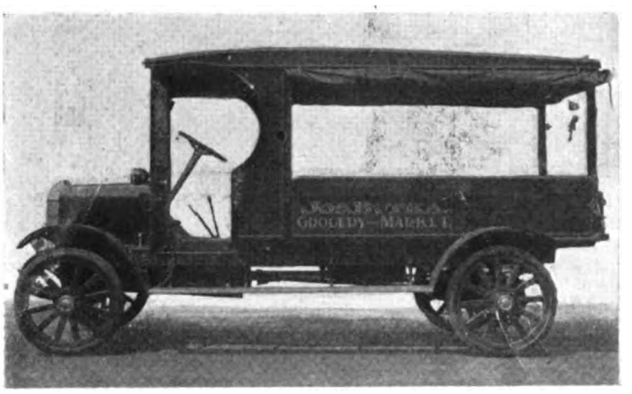




Dispatch 1,200-pounder which has a four-speed gearset of the friction type and inclosed side-chain drive

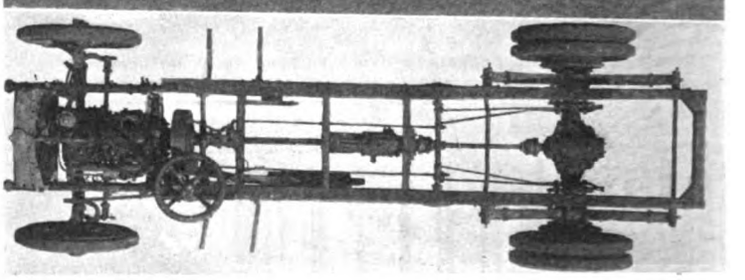
Dorris 2-tonner at the top with brewery body and in the chassis directly above. Note the unit powerplant and final worm drive

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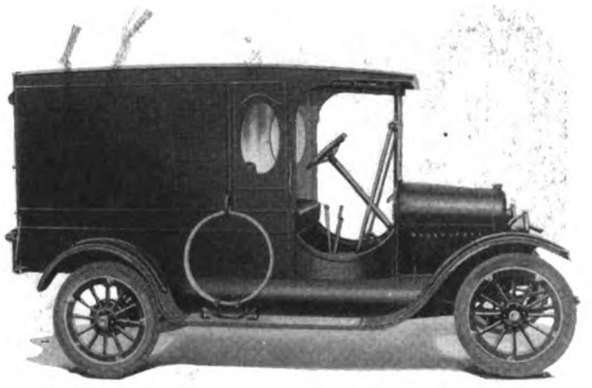


Fargo internal-gear-driven 1-tonner whose price has been reduced $185, from $1,575 to $1,390. Only one Fargo model is made

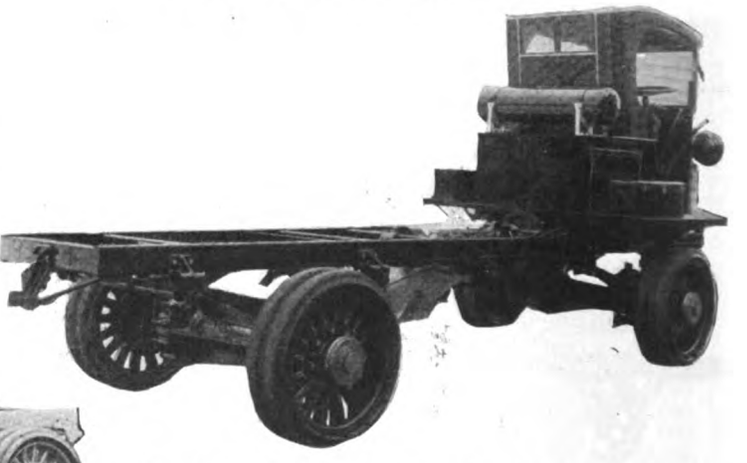




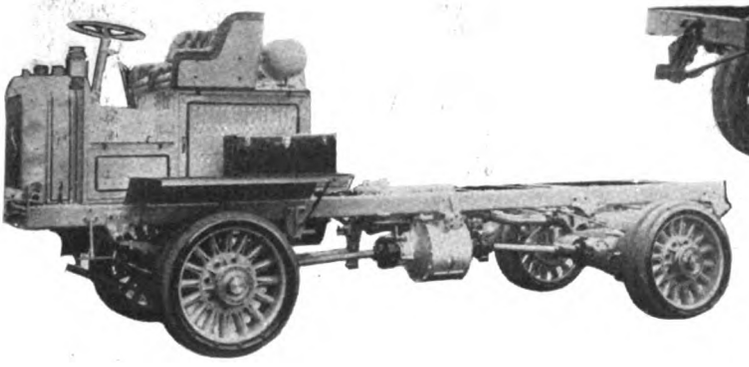
Federal 2-tonner, new in 1916. It bridges the gap between the 1½- and 3½-ton models. Besides these sizes, a 1-ton unit and a 5-tonner are also offered. The 2-tonner has a three-speed selective gearset mounted amidship to reduce the length of the driveshaft. The truck pictured above has Sewell cushion wheels



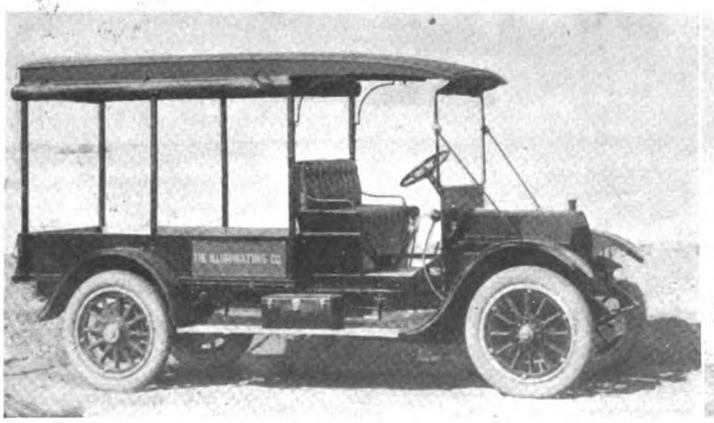
Fostoria 1,000-pounder which is sold complete with either a panel or express type body. It is featured by its low price



Rear view of the F. W. D. 3-tonner which has an individual-clutch gearset amidship and drives through bevel gears to all four wheels. Note motor location



F. W. D. 5-tonner which follows the same general design as the 3-tonner. It is four-wheel driven with the motor under the seats



Gabriel 1,500-pounder with bevel drive and selective gearset mounted amidships. It is unchanged from last year



Gabriel 1½-tonner which employs final worm drive and is offered with 36 by 5 pneumatics all around, with duals in the rear

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ture from previous Garford practice.

The Garford company reorganized during 1915, when it changed the location of its plant from Toledo, Ohio, to Lima and changed its name from the Garford Co. to its present one. The design of the trucks was altered at the same time, the chain-driven models of 2, 3, 4, 5 and 6 tons capacity made previous to 1915 being redesigned with worm drive, except in the case of the two larger models, which are continued substantially the same as before. The present 1-, 1½- and 2-ton models were new at the beginning of 1916.

Garford trucks are partly manufactured and partly assembled, although the company's plant is equipped to make all component parts if necessary. Garford commercial vehicles are sold all over the country and also abroad. They are not sold from the factory on any form of time payments, although the company's dealers or agents may do so if they so desire.

Although the Garford company is prepared to furnish standard bodies for all its models, the great majority are sold as stripped chassis and have the bodies applied locally at the points at which the vehicles go into service.

Electric starting and lighting equipment is not indorsed for use on the 5 and 6-ton trucks, but is furnished as optional equipment on the four smaller models at extra cost.

The use of trailers with Garford trucks is indorsed. The 2-ton chassis and the three larger models are fitted with drawbars at the Garford factory when it is expected to use them in connection with four-wheeled trailers. Many of the Garford trucks are also in service with two-wheeled semi-trailers with steel-tired wheels. In fact, the Garford company offers three models of short-wheelbase tractors of 4½, 7 and 10-ton capacity especially for semi-trailer use. In each case, it is recommended that the total trailer load to be carried be passed upon by Garford engineers at the factory in order that the traction vehicle give the best results.

All of the Garford trucks have pressed steel frames of a semi-rigid type. The motors of the four worm-driven models are cast in block with the valves at the right. The motors of the 5 and 6-tonners have their cylinders cast in pairs with the valves opposite. Dry-disk clutches and selective gearsets are used on all models. The 1-tonner has a unit powerplant. The other three worm-driven models have their gearsets amidships and the two chain drivers have them in units with the jackshafts. The three largest models have four-speed types and the smaller models three-speed units. Right steer is employed on every model.

Gary

3-ton Worm Driver Added—Now Five Models

GARY TRUCKS, made by the Gary Motor Truck Co., Gary, Ind., are offered in five models for this year, one of which, a 3-tonner, is brand new. Gary commercial vehicles were first manufactured in 1915. All are worm-driven and follow the same general design.

They are an assembled product and are produced in ¾, 1, 1½, 2 and 3½-ton sizes. They are sold principally in the Central States.

The four smaller models follow conventional truck design and are equipped with unit powerplants under hoods forward of the dashes and final worm-drive with Sheldon axles. The motor in each case is of the L-head type. The clutches are of the dry-disk type and the gearsets of the selective type with three speeds. The frame of each model is of pressed steel. Single solid tires are used both front and rear on the four smaller models. Details of the 3-tonner are not available at this writing. Left steer and center control are employed.

Geneva

One Chain-Driven Model Carried Over

GENEVA trucks, made in but one model of 1,500 pounds capacity by the Geneva Wagon Co., Geneva, N. Y., are carried over from last year without change in price or design. The vehicle is featured by the use of a two-cylinder motor under a hood with the radiator on the dash, a planetary gearset and double-chain final drive.

The Geneva truck is practically an assembled product which is sold mostly in upper New York State. Although it is made in but one chassis model, it is equipped with one of two standard types of bodies. One of these is a light open express type and the other a heavier panel design. The load capacity when the latter body is furnished is 1,000 pounds and 1,500 pounds when the open express type is mounted, the difference in the capacities being due to the difference in the weights of the bodies.

The two-cylinder motor is 5¼ by 4¼, with a rated horsepower of 22.10. It drives through a dry-plate clutch to a two-speed planetary gearset in a unit with the jackshaft. Right steer and right control are employed.

G. A. Schacht

1½-tonner Added to Line of Two Models

ONE model of 1½ tons capacity has been added to the G. A. Schacht line, made by the G. A. Schacht Motor Truck Co., Cincinnati, Ohio. The new model follows the same general lines as the 2 and 3-tonners, which are carried over from last year without change in price and with but few minor changes in design. Both the old models are now fitted with radiators having cast-cases instead of sheet-metal casings. Half-elliptic springs are used in the rear instead of those of the platform type and 38-inch wheels replace 40-inch ones formerly used on the 2-tonner. Thirty-eight-inch wheels are now standard on all models.

G. A. Schacht trucks are partly assembled and partly manufactured, the Schacht company making its own worm-driven rear axles, selective gearsets and control levers, motor governors and chassis frames. The remaining parts are purchased outside and assembled.

At the present time the majority of G. A. Schacht trucks are sold in Cincinnati and in the State of Ohio. The Schacht company does not indorse the sale of its trucks on time payments. It prefers to sell its vehicles as stripped chassis, but will furnish bodies.

Electric lighting equipment is optional at extra cost, but starters are not indorsed. Trailers may be used in conjunction with G. A. Schacht trucks, which are provided with drawbar attachments when so ordered.

All three models are equipped with rolled-channel frames of the flexible type. The motors are under conventional hoods and drive through cone clutches to three-speed selective gearsets mounted amidships. Torsion arms are provided to take the driving torque and radius rods for the propulsion.

Gersix

New Model Added—Price Increase Made

SIX-CYLINDER motors are provided on Gersix trucks, made by the Gerlinger Motor Car Co., Tacoma, Wash., formerly of Portland, Ore. They are offered in two models, each of 2½-ton capacity. One of these was new during 1916 and is continued for this year without change in design, although the price has been raised from $2,550 to $2,650, an increase of $100. The older model is carried over from 1915 without change in design or price.

Both models are worm driven and follow the same general design except that the newcomer has a square-tube cast-case radiator instead of a cellular cast-case type; a three-speed individual-clutch gearset instead of a four-speed selective gearset; a vacuum feed gasoline system instead of one which feeds by gravity and a dryplate instead of a dry-disk clutch. The driver's cab has been made more compact, thus giving a larger loading space aft of the driver's seat. Both models are equipped with starting and lighting systems as standard equipment.

Gersix trucks are an assembled product which is sold principally in the Pacific northwest. They are not sold on time payments from the factory, but may be purchased on installments through two retail branches and through dealers. Gersix trucks are sold as chassis only.

Electric lights are furnished on both models. A Westinghouse starter and generator with Willard battery and with either Bosch magneto or Westinghouse ignition are furnished as standard equipment. Gersix trucks are not indorsed for use in connection with trailers.

The motors of both models are of the same size, 3¾ by 5½, with a N. A. C. C. horsepower of 33.75. In the older model the drive is taken through a dry-disk clutch and a four-speed selective gearset in a unit powerplant to the worm-driven rear axle with springs on the Hotchkiss plan. The same design is employed on the new model except that the clutch and gearset types have been changed as pointed out above.

G. M. C.

Chain Models Dropped—One Worm Added

DROPPING all of its chain-driven models and in addition a 1¼-ton worm-driven unit, the General Motors Truck Co., Pontiac, Mich., offers a six-model line of which a 1-ton worm-driver is new for 1917. Prices have not been increased, although it is the opinion of the manufacturer that prices will have to be raised if the prices in the material market continue to mount higher.

The complete 1917 line consists of a bevel-driven 1,500-pounder and worm-driven vehicles of 1-, 1½-, 2-, 3½- and 5-ton capacity. All except the two smallest models have four-speed selective gearsets. The chain-driven models dropped this year were of 1¼, 2, 3½ and 5 tons capacity.

G. M. C. trucks are an assembled product, which is sold all over the world. They are not offered on any forms of time payments and the great majority are sold as stripped chassis. All models are furnished with electric lighting equipment at an extra charge. Electric starting is not indorsed and not fitted on any of the models.

In design, all G. M. C. trucks follow the same general lines with the exception of the two smallest models. The new 1-tonner differs most, having a pressed-steel semi-flexible frame, unit powerplant and a worm-driven axle with springs on the Hotchkiss plan. All the other models have rigid frames and all except the 1,500-pounder take the propulsion through radius rods and the torque through the springs. The 1-, 1½- and 2-ton models have unit powerplants. All models have selective gearsets, those of the two smallest models having three speeds and the others, four speeds. Left drive and center control are employed on each model.

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Globe

Six-cylinder 1¼-tonner Unchanged

OPTIONAL DRIVE, six-cylinder motors and special rear springs are the outstanding features of the Globe truck, now made by the Globe Motor Truck Co., Northville, Mich. That concern was formed from the Globe Furniture Co., of the same city, to carry on the motor truck portion of the business. One principal model of 2,500-pound capacity is offered, although this may be supplied in 1,500-pound and 1-ton sizes by the use of slightly lighter load-carrying parts. The motors and wheelbase remain the same in each case. The drive option is between worm gears and internal gears.

Six-cylinder motors are supplied on the Globe trucks because of the superior flexibility of this type and the resultant ability of the truck to do more work on high gear. The Globe rear springs differ from those of conventional design in that they have no center bolts, but instead steel bands shrunk over them at the middle. The top and second leaves of each spring are extra heavy to provide additional strength to take the torque and propulsion on the Hotchkiss plan. The frame is of the semi-flexible type, made of rolled channels. The motor is 3¼ by 4½, with a rated horsepower of 25.39. It is cast in block, with the valves at the left. The drive is through a dry-disk clutch and selective three-speed gearset in a unit with the motor. A vacuum gasoline-feed system is furnished as standard equipment. Left steer and center control are used.

Gramm-Bernstein

Two New Models—Prices Increased

TWO NEW MODELS have been added to the Gramm-Bernstein line, made by the Gramm-Bernstein Co., Lima, Ohio. The newcomers are of 2 and 5 tons capacity and go to make up a seven-model line, each vehicle of which is worm-driven and employs an individual-clutch gearset mounted amidships. The capacities range from 1 to 6 tons, with trucks of 1-, 1½, 2-, 2½-, 3½-, 5- and 6-ton burden.

Gramm-Bernstein prices have been increased slightly. The 1-tonner costs $150 more, the 1½-ton unit, $200 more, the 2½-tonner $100 and the 6-tonner $200 more in each case. The 1-, and 2½-tonners are the same as last year in design, but the 1½-, 3½- and 6-ton trucks are fitted with larger motors.

Gramm-Bernstein trucks are a semi-manufactured product which is sold throughout the United States and abroad, being known in England as the Garner. They may be purchased on time payments in which one-third the sale price is paid in cash and the balance in notes to run not more than 12 months. Gramm-Bernstein trucks are guaranteed for use in connection with trailers and provision is made for such use when so ordered. Each model is furnished with electric starting and lighting equipment at an extra charge.

All models follow the same general design and have semi-flexible pressed steel frames, finned-tube cast-case radiators, individual-clutch gearsets mounted amidships and final worm drive. The 5- and 6-ton models have cone clutches. All the others use the dry-disk type. The three largest models have four-speed gearsets and the other models, units with but three speeds. Left steer and center control are used on each model of the line.

Great Southern

Two Bottom-worm Drivers Still Made

BOTTOM-WORM drive is the most unusual characteristic of the Great Southern chassis which was offered last year in 2- and 4-ton models by the Great Southern Automobile Co., Birmingham, Ala. The chassis was first produced in 1915 in the form of a twenty-five-passenger bus.

Details of the 1917 vehicles are not available at this writing, but if they follow last year's design they will have a low frame arching under the rear axle and underslung springs both front and rear. The arched section of the frame carries the spring hangers and consists of a steel casting which laps with the forward and back frame sections and is riveted in place. This gives a very low frame. The floor of the bus is laid directly on top of the frame and is but 26 inches off the ground. This is a very desirable feature in bus construction because only one step is necessary.

The bottom-worm axle used is of the usual type but turned upside down, and when in place on the vehicle has a clearance above the road of 7 inches.

Hahn

Two Models Dropped—Two Sizes Continued

CONVENTIONAL in design, Hahn motor trucks, made by the Hahn Motor Truck Co., Hamburg, Pa., are offered in but two models for this year, the 1½- and 3½-tonners carried last year having been dropped. The 1917 vehicles are of 1 and 2 tons capacity, each worm-driven.

The Hahn company is one of the pioneer wagon-building concerns of Pennsylvania and brought out its first motor trucks in 1915.

Hahn trucks are an assembled product which is sold principally in the East and especially in Pennsylvania. They may be furnished with standard or special bodies to suit the needs of the purchaser. They are not equipped with electric starting or lighting systems.

Each model has a pressed steel frame and employs a unit powerplant motor with dry-disk clutch and three-speed selective gearset. The 1-tonner is provided with springs which take both the torque and propulsion, but the 2-tonner has radius rods for propulsion and a torque arm for the torque.

Horner

5-ton Chain Replaced by 5-ton Worm

REPLACING a 5-ton chain-driven model by a worm-driven truck of the same capacity, the 1917 Horner line consists of four models, all worm-driven. The line is made by the Detroit-Wyandotte Motor Co., Wyandotte, Mich., and includes 1½-, 2-, 3- and 5-ton models. The 1½-, 2- and 3-ton models with chain drive offered in 1916 have been discontinued.

The Horner truck was formerly known as the Grabowsky. The Horner company began business in January, 1913, at which time the Grabowsky Power Wagon Co. went out of existence.

Horner trucks are an assembled product, which is characterized by a sloping French hood with the radiator on the dash.

All Horner trucks have rigid frames, those of the two small models being made of pressed steel and the others of rolled channels. Dry-disk clutches and three-speed selective gearsets are used on all models.

Harrison

3½-tonner with Chain Final Drive

BOSTON - MADE, Harrison trucks, made by the Robert Harrison Co., South Boston, Mass., are offered in one chain-driven model of 3½-ton capacity.

The Harrison is a partly-assembled and partly-manufactured product which is sold in New England and principally in Boston and its environs.

It has its motor under the floor and is provided with two radiators, one placed in a vertical position in front of the motor in the conventional manner and the other laid horizontally beneath the body at the rear. Water is drawn from the radiator at the rear by means of a gear-driven pump. It is taken in at the bottom of the water-jackets and discharged at the top of the cylinders into the dash radiator, from the bottom of which it returns to the rear radiator.

The motor is 4½ by 5, with the cylinders cast in pairs and the valves at the right. Dual ignition is employed. From the motor the drive is through a cone clutch to a three-speed selective gearset mounted in a unit with the jack shaft. Right drive and right control are employed.

G. V. Mercedes

Adapted Foreign Design Unchanged

NO CHANGES have been made in the G. V. Mercedes truck for 1917. It is a 6-ton internal-gear-driven vehicle made in this country by the General Vehicle Co., Long Island City, N. Y., under license of the Daimler company of Germany. It is an adaptation of the German Mercedes design and is featured by internal-gear drive and steel wheels as standard equipment.

It is a manufactured product which is offered for sale throughout the country. The General Vehicle company is also a large manufacturer of electric trucks and electric industrial vehicles. Besides the manufacture of trucks it carries on a general machinery business and is equipped to build special vehicles. In this class are several gas-electric tractors made for the City of New York during 1915 and at the present time used in the collection of refuse from the city's model street-cleaning district and for plowing snow in the winter. Provision is made in G. V. Mercedes trucks for their use in conjunction with trailers. The trucks are not equipped with electric lights or starters.

The truck has a rigid pressed steel frame. The motor, 4¼ by 5 9/10, with a horsepower of 29.00, is carried on a sub-frame and drives through a cone clutch and a four-speed selective gearset mounted amidships to the internal-gear-driven rear axle. The driving torque is taken by a torque arm and the propulsion through radius rods. The truck has right steer and right control.

Harvey

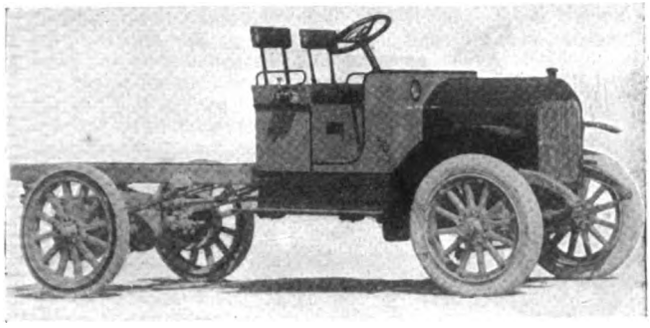
2-ton New in 1916—All Models Use Worms

ALL WORM-DRIVEN, Harvey trucks for this year are offered in 2-, 3½- and 5-ton sizes. The 2-tonner was new in the early part of 1916. The other two models are carried over without change except that the motors are now supported at three points on the main frames instead of on sub-frames. The price of the 3½-tonner has been increased $250, from $2,700 to $2,950, and that of the 5-tonner, $200, from $3,400 to $3,600.

Harvey trucks are an assembled product which is sold mostly in Illinois. It is made by the Harvey Motor Truck Works, Harvey, Ill., which previous to 1916 offered 1½- and 3-ton chain-driven models.

The Harvey company sells its trucks on time payments in which 25 per cent of the purchase price must be paid on de-

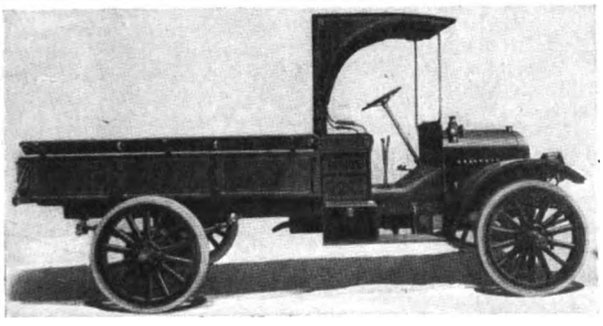
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Garford 1-tonner with steel cab, pneumatics in front and solids in rear as standard equipment, and final worm drive. It has a unit powerplant. Electric starting and lighting is an extra



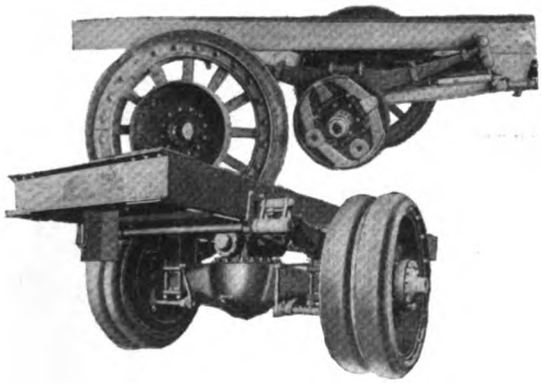
Garford 2-tonner similar to the 1-ton model shown opposite except that its gearset is mounted amidships. It has worm drive



Gary ¾-tonner which has a unit powerplant, worm drive, three-speed gearset and single solid tires all around



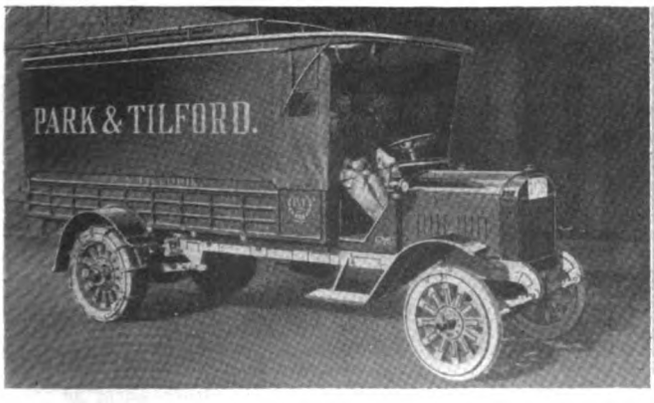
G. A. Schacht 2-ton worm-driven unit in which the propulsion is taken through radius rods and the torque through a torque arm. It has a three-speed gearset mounted amidships



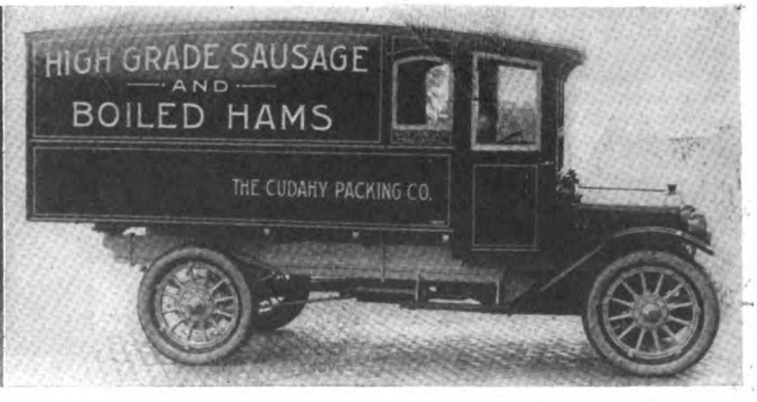
At the top, an end view of the Timken worm-driven axle used on the G.M.C. 1½-tonner, showing internal brakes and radius rods. Directly below, rear of G.M.C. 5-tonner



Globe 1¼-tonner which is characterized by the use of a six-cylinder motor and an option between worm and internal gears for final drive. Hotchkiss drive is employed

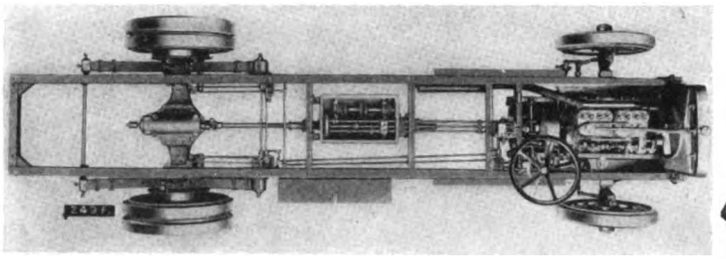


G.M.C. 2-tonner with worm drive in which the propulsion is taken through radius rods and the torque through the springs

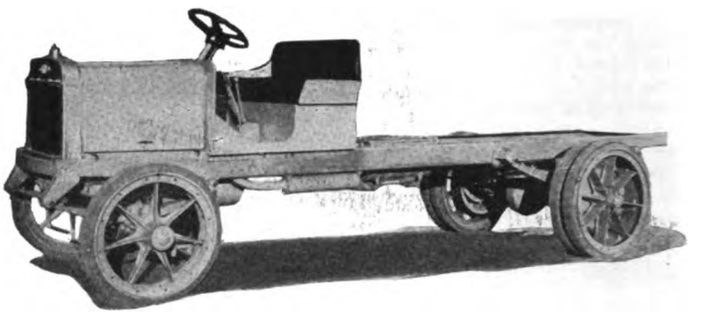


G.M.C. 1,500-pounder, a bevel driven unit on pneumatics. The smallest of the G.M.C. line of 1-, 1½-, 2-, 3½-, and 5-ton sizes

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Typical plan view of the Gramm-Bernstein chassis showing right steer, individual-clutch gearset amidships and final worm drive



Gramm-Bernstein 3½-ton worm-driven truck with steel wheels. These are furnished instead of wood at extra cost



Hahn 1-tonner, one of a line of two worm-driven models. It has a unit powerplant and employs Hotchkiss drive



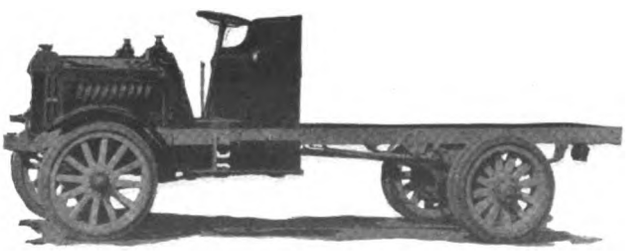
G. V. Mercedes, a 6-ton internal-gear-driven truck adapted from the German Mercedes design and made in this country by the General Vehicle Co., Long Island City, N. Y. The motor is mounted on a sub-frame and steel wheels are furnished as standard equipment



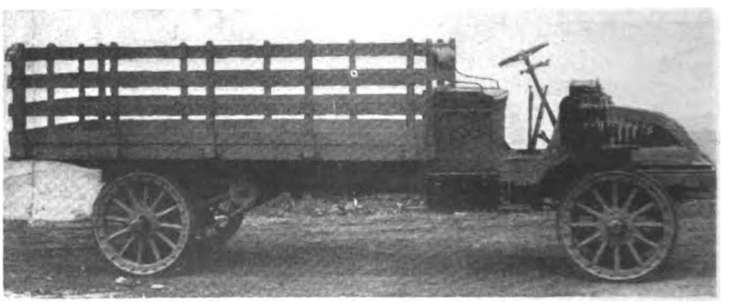
Hall 3½-ton model which is offered with a final drive option of worm or chains. If worm drive is used, heavier springs are supplied to take the propulsion and driving torque. The Hall line consists of three models, 2-, 3½- and 5-tonners



Harvey 3½-ton model which employs final worm drive. Two- and 5-ton models of similar design are offered. Four-speed selective gearsets mounted amidships are used in all models



The Hall 2-tonner which has a unit powerplant and final worm drive with torque and propulsion taken through the springs. Tires are the same all around, 36 by 4, duals being used at the rear



The Horner 2-tonner which may be had with either worm or chain final drive. The Horner truck was formerly the Grabowsky and is characterized by its sloping French hood

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livery and the balance within 1 year. The trucks are sold as chassis only, although the Harvey company will prepare body plans for body builders or make the bodies itself. Electric starting and lighting are indorsed by the Harvey company, which will supply such equipment on order at an extra charge. Harvey trucks are indorsed for use as tractors with semi-trailers and fifth-wheel mountings are provided.

All three models have semi-flexible frames made of rolled channels and block-cast motors, which drive through dry-plate clutches and four-speed selective gearsets mounted amidships. The driving torque and propulsion are taken through the springs in each case.

Hall

Two Worm Drivers Added—Prices Raised

THE ADDITION of two new models of 2- and 5-ton capacity and a price increase feature the Hall line for 1917, which in addition consists of a 3½-tonner with worm or chain drive at option and a chain-driven 5-ton truck. The price of the latter has been increased $200, from $3,400 to $3,600. Changes in design in the 1917 models consist of stronger transmission members, aluminum floorboards and electric lighting on all models at $50 extra.

The Hall line is made by the Lewis-Hall Iron Works, Detroit, which brought out the first Hall truck in 1915. It makes the frames for its vehicles and assembles the remainder of the chassis. The Hall truck is sold throughout the United States and in Europe, New Zealand and Australia. It may be purchased on installments when one-quarter of the price is paid in cash and the balance within 1 year.

Hall trucks are furnished as stripped chassis or with bodies as desired. They are indorsed for use with trailers and drawbar attachments are furnished when ordered.

All Hall models have rolled channel frames of the semi-flexible type. Unit powerplants, dry-disk clutches and selective gearsets are used. The gearsets of the two 5-ton models have four speeds and those of the others, three speeds. The worm-driven models take the torque and propulsion through the springs. Left steer and center control are employed in each model.

How Bay Staters Fought Increased Truck Taxes

BOSTON, MASS., Dec. 27—New York and New Jersey truck dealers and owners are now facing the same ogre, unjust legislation, that loomed up before the Massachusetts motorists a few years ago. Therefore they might pattern their efforts to combat the increased taxes after the style of the Boston motorists. It all began when the Highway Commission, in its annual report to the legislature in January, 1914, requested that body to increase the fees for motor trucks. Now, that commission is an influential body and it has some weight with the legislature. Its members are all former members of the legislature and they know how to get things done. So the legislative committee on Roads and Bridges took the matter up. At the request of a member of the Bay State A. A. a conference of some of the other motor organizations was called and the various bills were considered, among them the truck fee plan. At that time trucks were taxed $5 each irrespective of tonnage.

Realizing the possibilities of a bad measure going through, and with a view of preventing it, James T. Sullivan called attention to the matter in the motor columns of the Boston Globe. He urged the men interested to get busy and organize. Then he planned a committee with various motor interests.

Meanwhile Sullivan had presented a bill on his own account that called for a tax on all vehicles using the highways, which included horse-drawn types. It asked for a graduated scale. This bill was on the calendar for a hearing before the legislative committee. A meeting of the committee was called at which the truck propaganda was fully discussed. The newspapers were asked to do their share and they reported the meeting unstintingly. That was the opening gun. Very soon the Highway Commission began to take notice of the opposition. So the suggestion was made that the motor organizations confer with the Highway Commission on the matter.

There was a meeting at the office of the Highway Commission, with Chairman W. D. Sohier presiding and Commissioner J. D. Synan sitting with him. The motorists were represented by Mr. Fortesque, J. T. Sullivan, J. B. Sullivan and Day Baker. Commissioner Synan suggested that nothing less than $10 a ton should be considered. J. T. Sullivan said that it was not necessary to go any further, and to call the whole matter off. Chairman Sohier diplomatically avoided the issue, and the conference finally agreed on a plan of $5 for 1 ton and $2.50 for each additional ton.

A few weeks later, when the legislative committee met to consider the truck fees the motor representatives said that an agreement had been reached with the Highway Commission. Chairman Sohier arose and told the committee that the agreement was not in effect because Commissioner Kemp, who had not been present, said the fees should be $5 for each ton. That was so amazing that the motor representatives could hardly believe that the commission deliberately broke faith with them. The legislative chairman asked what was to be done. J. T. Sullivan arose and told the law makers that as long as the Highway Commission broke its agreement and wanted a fight he would plan one to beat it. He said he would not accept even then the first proposal of $5 and $2.50. He intended to fight against any proposed raise so that the rate then existing of $5 a ton should stand. And the fight was on.

The legislative committee said it felt bound to take heed of what the Highway Commission had said, so it favored a bill embodying the $5 for 1 ton and $5 for each additional ton. Then the rumor club got busy about lobbying. There was talk made that the bill could be defeated by raising a slush fund, but the rumor could not be pinned on anyone. Mr. Sullivan put an end to that by announcing that there would be no tribute paid, and if any money were raised he would expose the whole plan.

It was organization that counted then. The original motor committee was enlarged and representatives of big companies using trucks—contractors, ice, furniture, lumber, coal and other business houses—were called into conference. The representatives of the labor unions were secured on behalf of the truck drivers. The legislative committee reported out the bill as the Highway Commission wanted it. The motor representatives went to the State House and claimed that they were not treated fairly, as the committee had not held a hearing on the bill. They demanded a square deal. The newspapers featured the demand. Then some legislators began to hear from their constituents. The bill was recalled from the Senate and a date set for a hearing.

Finally the committee reported the bill again and it went to the Senate. Still the fight was waged. But as the Senate members of the Committee on Roads and Bridges were with the Highway Commission, and also the house chairman, the bill was passed quickly.

Then it had to go to the lower branch. There were more meetings called by the committee, and it was planned that if the bill ever got past the lower branch that it would be fought out before the governor. More men were picked out to go to the State House to see members. The various clubs were asked to say a word to their representatives. The labor men at the State House were doing their share. When the bill got to the lower branch after passing the Senate some of the motor people wanted to give up the fight.

The chairman of the Roads and Bridges Committee was ready to railroad the bill through. It came up in its turn, and when the Speaker went on with his usual procedure, requesting all in favor to say "Aye," there was a good response. When he asked for the "Noes" there was a shout that startled him. The vote was doubted and those in favor were asked to stand. A large number did. Then those opposed were told to get up. There were more than the others, and the bill was checked right there. But the fight was not over. The Roads and Bridges chairman, sore at being defeated, announced that he would ask reconsideration the next day. Then he started to repair his broken fences. The following morning reconsideration was moved, and he hoped that there would be enough to pull the bill out of the fire and put it over. When the Speaker asked for all who were in favor of the reconsideration to say so there was not much of a response. When he asked all who were opposed to state it there was another roar, and as one of the members of the legislature put it, "the bill was sent skyrocketing through the roof of the State House." And it was dead beyond all chance of going through, for its sponsor could not get enough votes to demand a roll call. Naturally there was jubilation at the result among the motorists. The Automobile Chamber of Commerce, as a result of the fight, sent a personal letter of thanks to Mr. Sullivan for what he did in breaking up the combination.

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The Readers' Forum

Devoted to topics pertinent to commercial vehicle operation design and maintenance. Open to the use of all readers. Communications must be accompanied by the sender's name and address, confidential if preferred. No charge is ever made for this service.

FACTORS IN ACCELERATION

Weight, Traction and Characteristics of Motor Are Important

To the Editor, COMMERCIAL VEHICLE:

Please let me know if a machine geared at 2% to 1, 4 by 5 motor, turning over 900 r.p.m., can, starting from low speed, in 200 yards, reach 30 miles per hour.—P. J. CANNING, Worcester Brewing Corp., Worcester, Mass.

It is impossible to arrive at any conclusion with only the above data. Acceleration depends upon brake horsepower, engine speed, gear-ratios, tire sizes, weight of the vehicle, traction, air resistance, mechanical efficiency and the characteristics of the motor. Two engines of identical specifications, in regard to cylinder sizes and brake horsepower at given speed, may have very different torque characteristics, so that one may accelerate much more rapidly than the other.

From the data above quoted, it is possible to say that provided the car is not too heavy, it is possible to attain 30 miles per hour at this gear-ratio at 900 r.p.m. if 31-inch tires are used, making a liberal allowance for slip. How soon it could reach this speed depends upon unknown factors.

Obviously the above query does not concern a commercial vehicle.

SUGGESTS MILITARY BUMPERS

Opposing Front and Rear Bumpers Would Make Standardization Useless

To the Editor, COMMERCIAL VEHICLE:

Permit me to submit herewith my idea of what a truck bumper ought to be for military use. I have taken a great deal of interest in the various types which have been fitted to the trucks exported to the warring nations, but have yet to find any which had not serious faults.

For example, how few of our contributions to the European transport trains have any protection at the rear? Something is needed, both to protect the rear of the truck and the front of a following truck. Some trucks have been fitted with double bumpers, but their disadvantages are glaring.

All of these so far coming to my notice have the rear bumper exactly like the front one. Therefore, if two trucks come together these are expected to meet and prevent damage. But their designers have not remembered that many roads are uneven and with one truck on a different level from the other, the bumpers may miss and the two vehicles may do each other considerable damage. Again, if one of these trucks happens to be followed by a truck of another make, the bumpers would, more likely than not, fail to coincide.

Therefore I have sketched the arrangement shown in Fig. 1, which is self-explanatory.—H. C. MERRILL, Cleveland.

Had the drawing been finished, the disadvantage of this form of rear bumper would be apparent. Fig. 2 shows a truck with a body with such a bumper. It will be noted that the rear bumper prevents the tailgate opening. Fig. 3 shows what is regarded by THE COMMERCIAL VEHICLE as a better scheme. Here the vertical bumpers are two in number and placed in front where they do not interfere with anything and also escape from the great weakness in horizontal bumpers which is illustrated in Fig. 4. The horizontal rear bumper does not interfere with the tailgate.

It might be objected that this does not dispose of Mr. Merrill's objection to the horizontal rear bumper due to its likelihood of not striking the horizontal bumper on another following truck. The same might be said of a horizontal front bumper failing to meet a horizontal rear bumper on a leading truck. So, after all, standardization is much to be desired.

MAKER OF MONARCH GOVERNOR

To the Editor, COMMERCIAL VEHICLE:

Will you please advise us the name and address of the manufacturers of the Monarch governor?—BESSER MFG. Co., Alpena, Mich.

Monarch Governor Co., Twelfth and Bethune streets, Detroit, Mich.

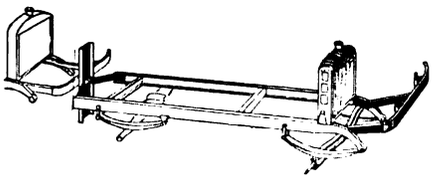


Fig. 1—Front and rear bumpers. The latter would prevent opening the body tailgate

WILL A 2-TON TRUCK DO?

Phonograph Maker, Buying Cautiously, Wants Installation Data

To the Editor, COMMERCIAL VEHICLE:

We are under the impression that a 2-ton truck will save us money and give our customers better service than we are at present getting from our local truckmen.

We receive daily from local freight yards about 7,000 lbs., but on the other hand, we ship to local trade only a small proportion of this amount. We therefore estimate that it would be more economical to make several trips back and forth to the freight yards and do this work with a lighter truck, which we deem would be sufficient for local deliveries. The daily route would probably cover the Battery to the Bronx, say about One Hundred Eightieth street.

On the other hand we would like to know what cost of maintenance, drivers' salaries, insurance, rentals, etc., and other incidental expenses would be entailed in a 2-ton truck. In other words we are looking at this matter both from an economical standpoint for ourselves and better service for our local dealers.

Any information which you can give us to help in determining the policy we shall follow in this respect will be greatly appreciated and we shall be glad to have your recommendations as to the best 2-ton truck in the market.—B. D. COLER, secretary, Emerson Phonograph Co., New York City.

Without a knowledge of the volume of daily deliveries to the local trade, it would be difficult to determine what capacity of truck would be best suited to the work. However, as a general rule it is safest to select the truck for the maximum load which is likely to be carried in regular service. From the remarks in the inquiry it would seem that the load would be less than this amount. It would be decidedly poor policy to attempt to select a compromise capacity midway between the 3½-ton freight house loads and possibly ½-ton delivery loads, underloading the truck on delivery work and overloading it on freight house haulage.

The two services seem to be so utterly incompatible that THE COMMERCIAL VEHICLE doubts if any attempt should be made to do both with one vehicle. Furthermore it is a matter of doubt if the New York freight terminal work can be economically handled by a motor truck. The congestion at the West street and some of the East river piers is so great that nothing but a horse and wagon, and in some cases an electric truck can

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be efficiently employed. If the shipments come in at several of these piers and at various times of day, it might take the entire time of one truck to pick them up.

Furthermore, in freight house work a slow-speed truck, possibly an electric, shod with solid tires, would be best adapted. For efficient delivery service a light and speedy vehicle is ideal, which requires pneumatic tires.

Doubtless the best arrangement would be to continue to have the freight work done by the local trucking concerns, purchasing a light, pneumatic-tired truck for local deliveries. A motor truck would permit of extending local deliveries much farther than to One Hundred Eightieth street. Deliveries could be made twice a week to points as far distant as Port Chester, Hastings, Hackensack, Elizabeth, West New Brighton, Rockaway Beach and Oyster Bay. It is in this ability of a truck to give superior service that it pays the most dividends. In phonograph record distribution time is important, since the craving for a given piece of music is usually a temporary thing, and if the dealer cannot supply the record while the charm is still on the purchaser, he is likely either to get over his desire for it, or purchase a record of the same piece of another manufacture.

There is no best 2-ton truck. There are several classes of vehicle of this capacity, each of which is particularly adapted to a certain class of service. In each class there are representative vehicles between which there is little to choose. Without any knowledge of commercial vehicle application, the best guide for the buyer is first a thorough knowledge of the work he has to do and then investigation of companies in similar lines of work—not necessarily in the same business, however—to determine what equipment they use. Salesmen for motor trucks will be able to give valuable aid in such an investigation.

ANOTHER HYDRAULIC HOIST

Young Hoist, Horizontal Type, Now Made in Milwaukee

To the Editor, COMMERCIAL VEHICLE:

In connection with your reply to M. B., New York City, regarding manufacturers of body hoist for motor trucks, as printed in the December 1 issue of your journal, permit us to refer you to our advertisement on page 47 of the same issue and to call your attention to the fact that an illustrated article regarding

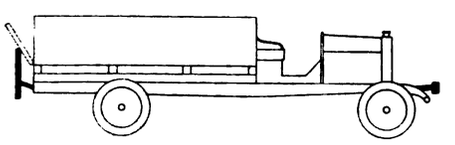


Fig. 2—Sketch showing how the vertical rear bumper would interfere with opening the body tailgate, thereby making it unsuitable for general use

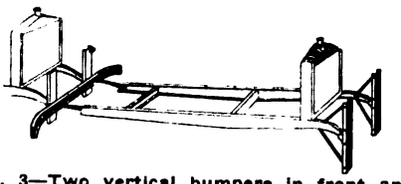


Fig. 3—Two vertical bumpers in front and one horizontal bumper at the rear—a good scheme

the Young Hoist appeared on page 27 of your issue of July 15, 1916.

For your further information we have to advise that while we have been installing these hoists on the Pacific coast for the past 3 years and have them in operation on almost all of the prominent makes of motor trucks, we have now located our plant for distributing to the eastern market in the city of Milwaukee. Our manufacturing facilities are such that we shall be able to handle a large volume of business in this improved equipment during the coming year.—E. R. BACON, president, Young Patent Hoist Co., Milwaukee, Wis.

ORIGIN OF TERM HOTCHKISS

How Spring Torsion and Propulsion Got Its Present Name

To the Editor, COMMERCIAL VEHICLE:

I have often heard the term Hotchkiss drive used and I understand its meaning. I would be interested to hear, however, how the term originated.—R. WALLACE, New York City.

The Hotchkiss drive gets its name from Hotchkiss, an American engineer who designed the Hotchkiss car, made in Paris. This was the first time that a shaft-driven motor car had been manufactured without some form of radius rod, torque-arm, torsion tube or other member to retain the axle in its proper relation to the shaft.

WHO SHOULD PAY DAMAGES?

A Treat for the Legally-inclined Mind in Quaker's Letter

To the Editor, COMMERCIAL VEHICLE:

I have before you, Gentlemen, a very long question which no dought you can answer for me as well as a lawyer. It was last august 1915 15 day that I was coming up what we call the Wilcox Road going toward Kane, Pa. at the time driving a 5 ton Saurer truck and coming toward me was a 5 passenger peerless touring Car I off course be very Kind to every one I gave them half off the Road and turned out one the Right hand side and and at the Same time change the Speed of the truck from 12 miles down 4 miles per hour. The driver of the touring car I noticed did not turn out So very much and I of course kept going for the ditch and he Did not turn more than a foot so then I seen I could not pass without my truck Running into his car which we did do we did come to-gether and the Claim Dept of the insurance co wants me to pay them $240.64c for damages now do you think that I should pay that to the co when I was in the Ditch at the time Who is it up to too Pay the $240.64 is it me or is it my Mother who by Rights owned the truck when my father Died and we also Sold the truck last july for $800.00 and their agent wanted Know what we Done with the $800.00 I up and told him it was none of his business for we had other debts to pay first. Will you please ans my very-very long question.—ARTHUR FLOYD NELSON, Mt. Jewett, Pa.

The Readers' Forum department of THE COMMERCIAL VEHICLE does not attempt to give legal advice, as such is beyond the proper range of a business publication. The above letter may be interesting to some readers, however, and a number of morals might be drawn from the experience cited. To indulge in long-range snap-judgment, it would appear that the best policy for Mr. Nelson to pursue would be that of watchful waiting.

ANOTHER CRAWLER QUERY

To the Editor, COMMERCIAL VEHICLE:

I would like to have the names of some manufacturers of Caterpillar tractors.—LOUIS PARE, Deschambault, Que., Canada.

Such a list was published on these pages in the issue of December 1, on page 31. There is but one maker of *Caterpillar* tractors, the name being the trade-marked one used to describe the product of a particular maker.

HEWITT-LUDLOW ON COAST

Frisco Maker Does Small Local Business—Has Small Production

To the Editor, COMMERCIAL VEHICLE:

We have recently been advised of the sale of six Hewitt-Ludlow trucks of 2-ton capacity, to a certain party, and as we have been unable to find any mention of this truck in any of the tables we have access to, we are writing to you to know if you know anything about this truck.—JAMES A. HARRIS, advertising manager, the White Co., Cleveland.

Hewitt-Ludlow trucks are made by the Hewitt-Ludlow Auto Co., San Francisco, Cal. Up to the present they have been made in small numbers and the business has been confined so strictly to San Francisco that THE COMMERCIAL VEHICLE has not considered the truck as of sufficient national importance to publish its specifications. The concern is listed in the Automobile Trade Directory, however. Some other publishers have published some specifications of this truck.

Soldier Employees of the R. E. Taylor Corp., New York City, eastern distributor for Garford trucks, are being paid full wages as long as they remain in Uncle Sam's services. Two salesmen of the Taylor organization have been at the Mexican border since the militia was mustered into the Federal service.

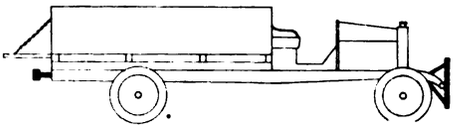


Fig. 4—The dual vertical bumper at the front and horizontal type at rear where it does not interfere with the tailgate

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New 1-ton Maxwell Chassis Marketed at $775

Commercial Design, But Uses Some Car Components

COMING as a complete surprise to the industry the new 1-ton Maxwell truck marks the entry into the commercial vehicle business of one of the best-equipped concerns in the world for the production of large quantities of light trucks at an astonishingly low price. Compared with the average 1-tonner on the 1917 market, as computed previous to the announcement of the new Maxwell, the truck measures up to it in most essential features except that it is slightly smaller, less powerful and lighter at a price approximately halved.

This price—$775—is the most sensational feature of the announcement, as it compares very favorably with the cost of an adapter and small-car chassis while being an integral unit built throughout for commercial work.

Of course many parts from the Maxwell passenger model are to be found in the truck. The entire powerplant, including the clutch and gearbox; the radiator, front axle and steering gear are taken direct from the passenger car and will be produced by the Maxwell plants in the regular way.

The frame, however, is a special pressed-steel member especially intended for this work, as are the semi-elliptic springs. The rear axle is a worm-driven truck axle, built by the Maxwell company, and the dash is of the Roman-front type with a business-like truck seat.

The engine is a four-cylinder two-bearing block design with a separate head, carrying the spark plugs, and has its valves to the side. The engine is 3⅝ by 4½, rating 21.1 horsepower by formula. The gearset and clutch are bolted directly to the engine, consisting of a cone clutch and a three-speed selective gearbox. The shaft which drives the rear axle is divided, the middle being supported on a bearing from a cross-member of the frame and three universals being placed at its ends and midpoint.

Hotchkiss drive is used and the brakes are all internal on the rear wheels. With its 124-inch wheelbase, the rear axle has been so located that about 75 per cent of the load falls upon the rear wheels. This partially accounts for the possibility of using the same units in front as are used for the passenger model.

It is planned to produce 25,000 of these for the coming year.

New ¾-and 1-ton Corbitts Added

Southern Firm Rounds Out Line of Trucks

SMALLER than previous Corbitt models, models G and E, of ¾ and 1-ton capacity are the latest addition to the line of the Corbitt Automobile Co., Henderson, N. C. In appearance they greatly resemble the larger models. Both are worm-driven, with Hotchkiss drive and unit power plants.

Other Corbitt models range from 1½ to 3½ tons in capacity. One of the individual features of the Corbitt truck is that it has its radiator suspended on coil springs and that this part is of the sheet-metal-incased cellular type, which of course permits the same cooling effect with less water and less weight.

All of the models are provided with governors set for a reasonable speed and all are designed to run on solid tires. However, the new ¾-tonner is offered with pneumatics of solids optional, and, of course the governor may be set for a higher speed when the truck is run on pneumatic tires.

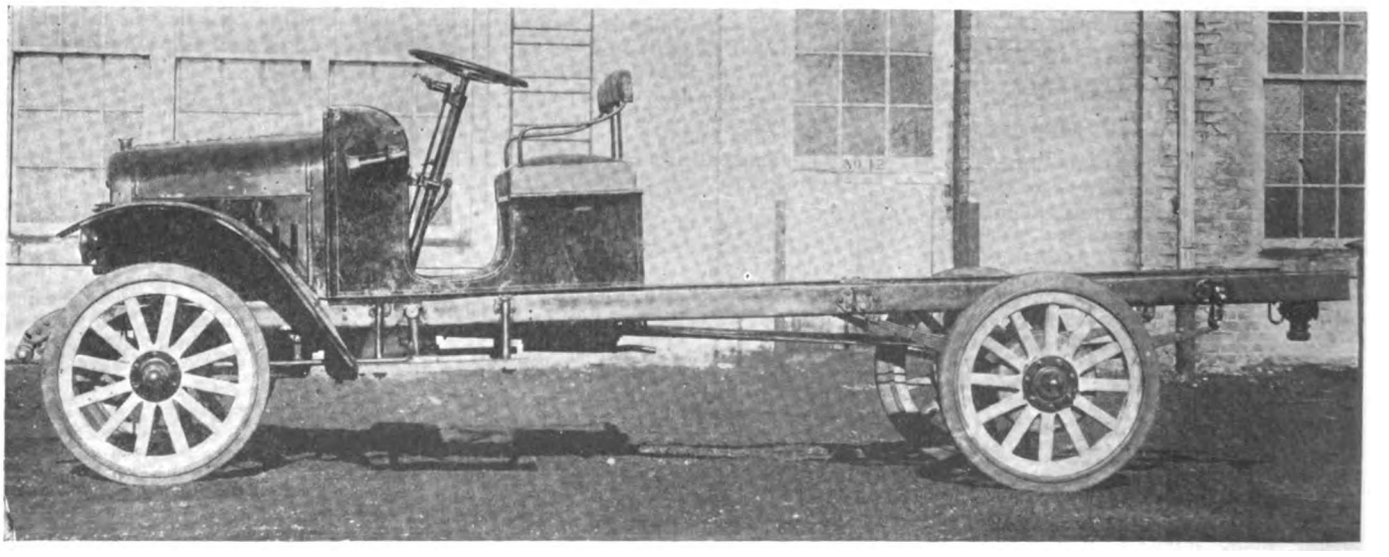
The engines on both of the new models are alike, being four-cylinder block-cast Continental motors bolted in unit with Fuller clutches and gearsets. These motors have three bearings and their valves are on the right side. Thermo-syphon water circulation is relied upon and ignition is supplied from a single Eisemann magneto. Spark control is hand operated. Governors are of Pierce make and are engine-driven. Stromberg carbureters are used on all models. These are fed by gravity from tanks under the seats.

The clutch is of the dry-disk type and the gearset is of the selective pattern

SPECIFICATIONS

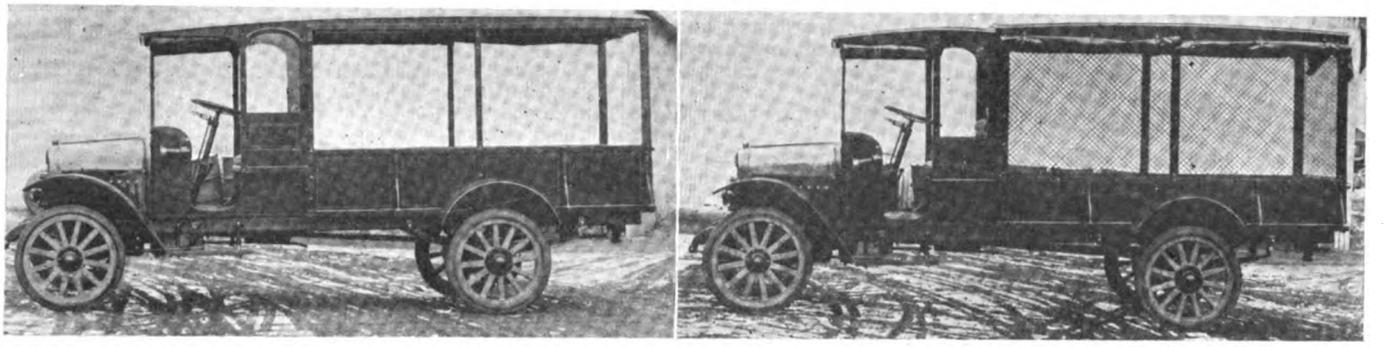
Capacity, lbs.	1,500	2,000	3,000	4,000	5,000	7,000
Price	$1,100	$1,300	$2,150	$2,400	$2,650	$3,200
Wheelbase, in.	130	130	138	148	148	168
Tires, front	34x3*	34x3½	36x3½	36x3½	36x4	36x5
rear	34x3½*	34x4	36x5	36x3½d	36x4d	36x5d
Bore	3¾	3¾	3¾	4½	4½	4½
Stroke	5	5	5¼	5¼	5¼	5½
N. A. C. C. Hp.	22.50	22.50	22.50	27.20	27.20	32.40
Speed, r.p.m.	1,200	1,200	1,500	1,500	1,500	1,500
m.p.h.	15	15	14	14	14	14
Final drive	worm gear					

*These sizes are for solid tires, pneumatics are 34x4 front and 35x4½ rear.



Side view of Maxwell chassis, showing Roman-front dash and giving an idea of the rear suspension

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Maxwell 1-ton chassis equipped with two standard body styles, showing proportions and roominess afforded

giving three speeds. Final drive is by a single shaft with two Blood Bros. universals to the Sheldon semi-floating rear axle. Brakes on this axle are side-by-side acting internally on the same drums. The frame is of pressed steel and Sheldon springs are applied. The Levine steering gear is on the left and the levers are in the center. The new models resemble their predecessor.

Otis Worm-driven Motor Truck Axles

Rugged Design in 3½- and 5-ton Sizes

Worm-driven motor truck axles for 3½ and 5-ton sizes are now being produced by the Otis Elevator Co., New York City. This concern has had a great deal of experience with worm gearing in application to freight and passenger elevators and operates extensive electric steel foundries. This is not the initial experience of the Otis company in the truck axle field, having been building axles for other concerns for several years and having developed the present type in supplying an order for a large number of special axles for the London General Omnibus Co.

An effort has been made to produce a fool-proof axle, in designing the Otis, and it is for this reason that the straight-type worm and an unusually secure mounting of the carrier have been adopted. The carrier, unlike the usual construction, is perched or registered in the axle bowl both at the top and bottom, giving it extraordinary rigidity and relieving it of driving and thrust stresses.

Another interesting feature of the Otis axle is that it will be supplied with either ball or Timken roller bearings in the worm carrier at the purchaser's option. Choice of several standard makes of ball bearings is offered. The wheels, however, are mounted on Timken roller bearings only.

Floating construction is employed and the housing is cast in one piece. Either the standard bevel-gear differential or any one of the recognized spiral-gear or worm differentials may be applied. The popular square section of axle at the spring perches is employed.

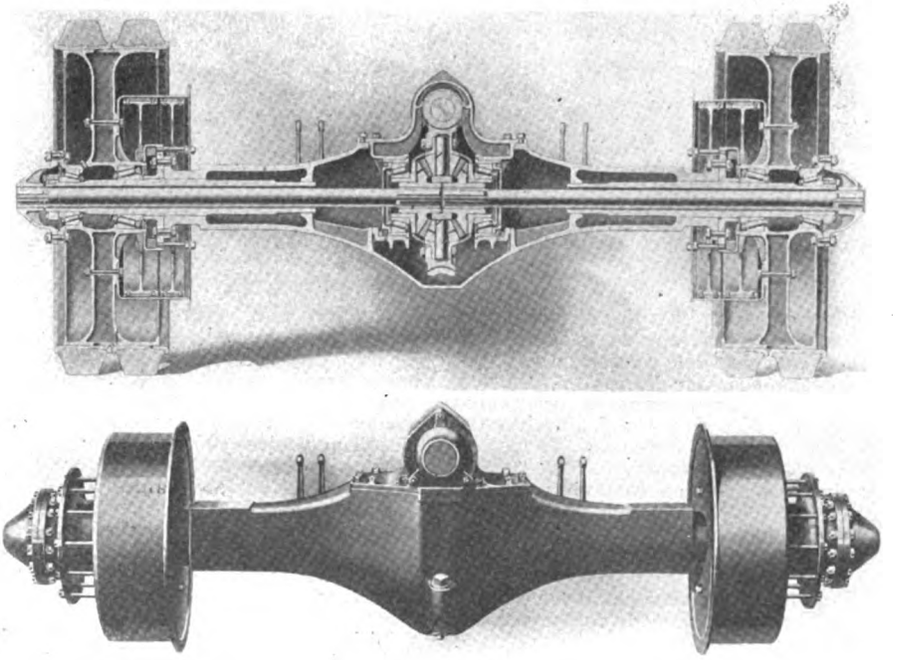
Although the Otis company has designed this axle for Hotchkiss drive, lugs are provided for the attachment of radius rods, if the manufacturer does not wish to go to the expense of securing the costly type of springs necessary to take propulsion as well as torque. No provision for torque members is made, on the other hand, it being the belief of the Otis company that torque duty is normal to the springs and that the axle will perform better if there is the amount of flexibility in the drive which this form of construction affords.

All of the castings in this axle are of electric steel. The main casting is of smooth exterior and very neat appearance. The spring perches are wide and long to give the springs a good seating for Hotchkiss drive. They also allow considerable latitude as to centers. The worm casing, worm-wheel carrier and cover for the axle bowl are a single unit. This is seated on the rim of the bowl, being secured by twelve bolts. It is also registered on seats cast on the inside of the bowl, at its bottom. The upper seating is horizontal and serves to take all vertical components of stresses on the carrier. The lower seating is vertical, the carrier simply sliding down into its lower seat, this serving to take all horizontal components of the stresses. There are no fastenings on the lower seats.

Wheel loads are taken primarily by chrome nickel steel tubes, pressed into the casing at 14 tons pressure. These are tapered in steps both inwardly and outwardly from their flanged middles. There are bosses cast on the inside of the housing to support the inner ends of the tubes. The tubes are heat-treated and machined to fit the wheel bearings and to take the brake carriers.

Brake carriers are separate castings, bolted to the flanged ends of the main housing.

When Timken bearings are used in the carrier, those carrying the differential are mounted in solid sleeves, pressed into the carrier and carrying their own adjusting rings threaded into them. When the axle is assembled, these provide for a nice adjustment of the wheel to the worm. When this adjustment has been made the sleeves have their adjustments positively locked so



Sectional and rear views of Otis axle, showing how worm carrier is registered in lower section of bowl, how axle tubes are held in housing, how bearings are disposed and arrangement of side-by-side brakes

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that they cannot be tampered with by an inexperienced person. If it is necessary to remove the worm-wheel from its carrier, this may be done by simply pressing out the bearings without altering their adjustment.

In the use of ball bearings for this portion, both radial and single-acting ball thrust washers are employed, the adjustment of the thrust bearings being locked in a similar manner.

On the worm shaft, when ball bearings are used, the rear end of the worm carries a double-acting single-row ball thrust bearing on spherical seatings, and two radial bearings on each end.

When roller bearings are used for the worm, they are reversed from the usual relation so that the effect of any expansion of the shaft due to heat would be to loosen the bearings instead of tighten them.

As is usual, the worm is of forged chrome nickel steel, machined, hardened and ground, and the wheel is of bronze of a type selected for low friction qualities as against steel.

The axle shafts are of chrome nickel steel, splined at both ends. A feature of the splining is that the shaft is turned down to the diameter through the cuts, so that the spline teeth are entirely above the surface of the shaft. This prevents localization of the strains at the point where the splines run out.

The inner splines register with the differential gear hubs and the outer ones with the wheel driving flanges. These are in the place of hub-caps and are bolted to the wheel flanges.

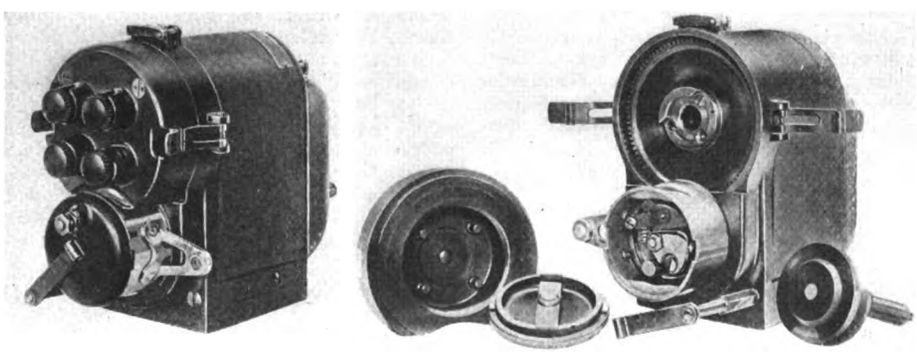
Brakes are all internal, the two sets being side by side. A unique feature in the Otis brakes is the difference in width of the two brakes. The outer shoes are considerably wider than the inner ones, it being intended that the outer ones shall sustain the heaviest duty and the inner ones the lightest, so that both will wear at the same rate instead of one set wearing out sooner and more often than the other, as is the case with both sets of the same width. Under ideal conditions it would be the hand brakes used in coasting and for slow stops that would be connected to the wide outer shoes, but in this country, with the mistaken habit of using the foot brake for almost everything, the reverse arrangement would no doubt be best.

The brake drum is a pressing of medium carbon steel, deeply ribbed at its edge to impart stiffness and to aid in cooling. Copper-asbestos facing is used and oil is prevented from reaching the braking surface by a groove in the brake bracket which catches any surplus which might pass the retaining washer at the hub. Separate pins are provided for the halves of each shoe so that there will be no chattering of these parts. They are mounted on oilless bushings, as are the cam rocker shafts.

The usual filler and drain plugs are provided to permit of the proper level of lubricant in the housing.

New Berling Magneto Completely Inclosed

Has Die-Cast Frame and End-bearings



The Berling magneto, complete and partially disassembled to show its simplicity and ease of access without tools

Differing from previous models in that a die-cast frame is used, a new Berling magneto has just been brought out by the Ericsson Mfg. Co., Buffalo, N. Y. This instrument is designated type E-41. Not only the frame but the end bearings are die-cast. The magneto is of the inclosed type, water-proof and dust-proof. The fastenings of the parts have been designed, however, so as to render all parts easily accessible for cleaning or adjustment. Quick-action clamps retain both the distributer block and the breaker-box cover, these clamps being arranged for operation without tools.

The distributer finger, it is said, is of the self-cleaning type, being provided with brushes which are designed to keep the contacts free of the collection of carbon. No change has been made in the essential features of the device, the same type of interrupter being used.

A feature is the construction of the condenser. This is made of layers of tinfoil and mica. The mica is gauged to exact thickness and tested for defects with a high-tension current.

Norma bearings are used for the armature shaft and not only is provision made for magazine oiling, but for draining off the surplus oil. The base is arranged for standard S. A. E. base mountings.

Either single or dual types are furnished in this type, the dual type having a separate interrupter and coil in the cartridge form, a unit with the switch.

Baltimore Taxed Out of Right Place as Truck Center

(*Continued from page* 20)

While Baltimore is a large food center and the nearest large port on the Atlantic coast to the Panama Canal, trucks are not used to any great extent as yet in the delivery of food products from the markets to the homes of the people or in the haulage to the steamship piers. Light delivery trucks are not used in the final delivery of food products because of the still-continued custom of Baltimore housewives to go to the markets and bring back their purchases in large arm baskets. Trucks are not used in haulage to the docks and local freight terminals because of the river-front congestion and antiquated and slow methods of handling freight on the docks and freight station platforms.

Baltimore's streets have also retarded the growth of trucks. The city is very hilly except along the river front and a large proportion of the streets are paved with cobble stones. The city has an area of 31.65 miles and 436.87 miles of improved streets, exclusive of 154.06 miles of alleys. On January 1, 1916, the pavements of Baltimore's streets were as follows:

	Miles
Alcott's improved pavements	1.35
Amiesite	.20
Block asphalt	16.11
Bitulithic	9.39
Bituminous concrete	13.62
Cement surface	2.05
Cobble	144.33
Granite block	39.19
Bituminous macadam	2.96
Ordinary macadam	32.19
Medina block	.06
Scoria block	.02
Sheet asphalt	106.57
Vitrified block	47.17
Wood block	1.62
Rocmac	.09
Unpaved	19.55
Total	436.87

From the table it is seen that cobble pavements were used on about one-third of the total mileage of streets at the beginning of 1916. During the year, however, a considerable portion of such pavement has been replaced by smoother types more suitable for truck use.

Besides being a large food center and an important port, Baltimore is also prominent for its clothing, neckwear, fertilizer, straw hat and copper-refining industries. She also boasts of one of the four largest wholesale merchandising concerns in the world, the Baltimore Bargain House, whose business last year amounted to approximately $22,000,000. That concern uses trucks to transport its goods between its warehouse, ten-story sample building and the various docks and freight stations. The trucks use demountable bodies which can be placed on the trucks and the empty ones taken off in an average of 5 to 6 minutes. Baltimore's department stores, furniture stores, grocery stores and even some of the small corner merchants use commercial vehicles.

That there is a great opportunity for the increased sale of trucks in the city provided the burdensome taxes are removed is borne out by the fact that the city has 20,116 horses, which are registered as follows:

Single teams	10,116
Double teams	4,593
Triple teams	192
Four-horse teams	49
Six-horse teams	7
Total teams	14,957

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Accessories for the Truck

Ideal Pressure Primer

With the present grades of fuel and in cold weather priming becomes almost a constant necessity on motor trucks. The Ideal Brass Works, Indianapolis, Ind., is still producing its pressure primer, which has been marketed for several years past. It is a simple plunger pump designed to be screwed to the dash and connected with the gasoline line and the manifold.

The pump body carries a flange. To install it a hole is bored in the dash and the pump screwed to the dash, with the flange on the back side. There are two tube connections, the lower of which terminates in a union designed to be interposed in the fuel line and the upper to be tapped into the inlet manifold. The nipple on the end of the upper tube is provided with a nozzle at its end to spray the fuel, instead of merely injecting it.

The union attached to the end of the barrel of the pump, which serves as the connection for the two tubes, contains ball check-valves for each. In operation the handle of the pump is given one stroke, which charges the manifold with gasoline vapor. The device complete with tubing and attachments retails at $5.

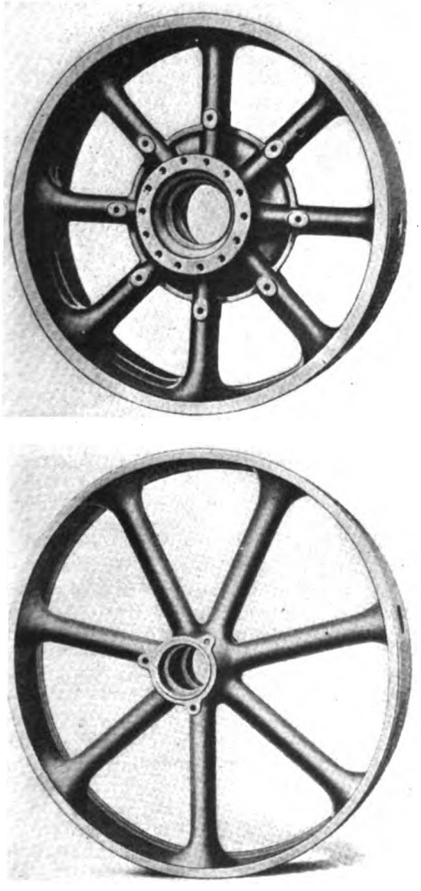


Fig. 1—Otis steel wheels. Above, rear-wheel type; below, front-wheel form

Otis Steel Truck Wheels

One-piece hollow cast wheels are being produced by the Otis Elevator Co., New York City, in addition to worm axles. These wheels are of the straight-spoked type and are made of annealed electric furnace steel. They are finished on the inside to receive the bearings direct and on the outside wither for demountable or pressed-on tires, in S. A. E. sizes. The rear wheels for application to the Otis worm-driven axle is given a considerable offset, that is, the spokes are placed outside the center line of the wheel plane in order to give a reasonably narrow tread and at the same time brake drums of exceptional width.

Truck Tire Chain

A simple cross-chain designed to encircle the tire and to be anchored to the spoke is the truck-tire chain, produced by the Herman Mfg. Co., Washington, D. C. Its features are its quick attachability and the form of chain used. The latter is of the short-linked type with well-twisted links. This presents a smooth surface to the tire, all links lying flat instead of each alternate one standing upright to cut the tire, as in the case of untwisted links. Another feature is that there are two cross chains, joined at their ends to large rings at each side. To these rings is attached a single chain with a grab-hook which wraps about one of the spokes. The grab-hook gives ready adjustment and permits quick attachment and detachment without tools and with the hands gloved. Four or six of these should be fitted to each wheel.

A lower-priced chain is fitted with a web strap instead of a chain to attach it to the spoke, but with the same double cross chains. They are made in sizes to fit all solid tires from 3 inches to 7-inch duals or 14-inch giants and pneumatic tires from 3½ to 5½ inches. Prices vary from $5 to $21 per set of six.

Sternwear Thick Tube

Characterized by an astonishing thickness, a pneumatic tube has just been marketed by the Sterns Tire & Tube Co., St. Louis, Mo., whose purpose is to prevent punctures and blowouts. The tube is simply a thick one reinforced by two layers of cotton fabric. The outer layer is close to the surface and the inner one close to the inside, leaving a deep cushion between. The strength of these two fabric strips and that of the rubber itself is relied upon to prevent blowout and the thickness of both to avoid puncture.

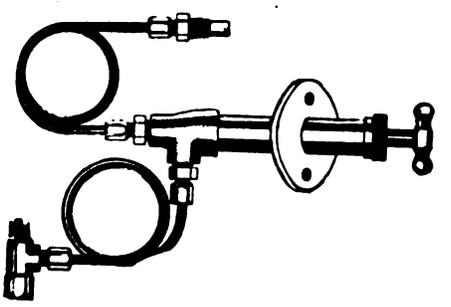


Fig. 2—Ideal pressure primer

X Radiator Leak Fluid

To stop leaks without removing the radiator or resorting to solder X radiator liquid is produced by the X Laboratories, Boston, Mass. It is claimed to contain no cement, acid, glue, meal or shellac, and that it will not clog the radiator. It is also said to prevent the formation of scale and rust and asserted that it will repair leaks in cylinder jackets and even leaks in Stanley steam boiler tubes.

Its action is described as a hardening when exposed to the air. Thus, when introduced into the water, it eventually finds its way into any leaks; in leaking out it is exposed to the air and hardens, according to the manufacturer. It is sold in 75-cent and $1.50 cans, for large and small vehicles, respectively.



Fig. 3—Sternwear thick tube, as applied to standard casing

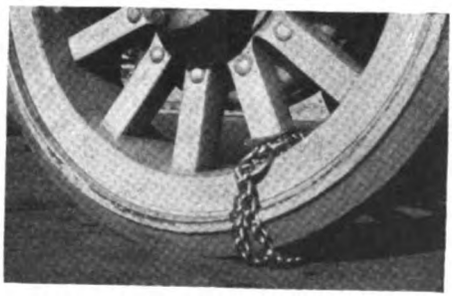


Fig. 4—Truck-tire Chain as applied to wheel

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Men and Makers



LOCOMOBILE CO. OF AMERICA, Bridgeport, Conn., maker of the Riker truck, will erect a factory addition, 100 by 160 feet, one story high.

Stegeman Motor Car Co., Milwaukee, Wis., maker of the Stegeman truck, plans the erection of a factory addition, 79 by 190 feet, adjoining the present plant on Woodworth and Linus streets. The new structure will be fireproof throughout and will cost approximately $50,000, with equipment. It will be used principally for assembly purposes and will enable the available space in the present shops to be increased so that a larger production of parts can be turned out.

Continental Motor Truck Co., Superior, Wis., has completed work on its new factory and machine shop. A new power house is at present in course of construction.

White Motors Co., Providence, R. I., distributor for White trucks and passenger cars in Rhode Island, has moved into a new building at 264-266 Crown street, in that city, where showrooms, service station and a parts department will be maintained.

Diamond-T Motor Truck Co. of New York, 245 West Forty-fifth street, distributor for Diamond-T trucks, made by the Diamond-T Motor Truck Co., Chicago, has taken an additional floor in the building in which it is at present located. This will permit it to use the ground floor for offices and salesrooms exclusively.

Willys-Overland Co., Toledo, Ohio, will establish a new factory branch in Winnipeg, Manitoba, Canada. It will serve as a distributing point for the entire Province of Manitoba. The new branch will be the third of the Willys-Overland Company in Canada, others being located at Montreal and Regina.

White Motor Sales Co., Columbus, Ohio, has been formed, with salesrooms at 171 North Fourth street, to handle the White line in eleven counties in central Ohio. A factory-trained expert has been placed in charge of the service department.

Smith Form-a-Truck Co., Chicago, maker of the Smith Ford adapter, has opened its own branch in New York City at 1875 Broadway. The present office of the company at 1834 Broadway will be moved to the new address shortly after January 1, 1917.

Willard Storage Battery Co., Cleveland, Ohio, will soon commence the erection of an additional factory building to cost $35,000 and a storage warehouse at $7,000.

Pyrene Mfg. Co., New York City, has called a meeting for January 2, 1917, at which the stockholders will take action on a proposed enlargement of capital from $1,050,000 to $3,050,000, an increase of $2,000,000. The present stock is divided into 100,000 shares of common and 5,000 of preferred. It is proposed to bring out a new issue consisting of 300,000 shares of common and 5,000 shares of preferred, each share to have a par value of $10.

C. A. Shaler Co., Waupun, Wis., has absorbed the business of the 5-Minute Vulcanizer Co., Kansas City, Mo., and the Vulcan Mfg. Co., Denver, Colo. The Shaler company has also recently acquired from W. H. Miles of Longton, England, and A. B. Low of Denver three basic patents covering tire vulcanizers in which a solid fuel is used.

Sparks-Withington Co., Jackson, Mich., maker of motor vehicle horns and radiator fans, will open a branch office in Cleveland, Ohio, with A. A. O'Reilly in charge.

Elwell-Parker Electric Co., Cleveland, Ohio, maker of the Elwell-Parker electric industrial truck, will enlarge its plant by the erection of a four-story building, 60 by 120 feet. The new structure will be a duplicate of an extension built last year and a third unit of the same size will be erected next year.

San Francisco Branch of the Guaranty Securities Corp., New York City, which specializes in time-payment plans for the purchase of motor trucks, as outlined in the November 15, 1916, issue of THE COMMERCIAL VEHICLE, has been moved to 1366 Van Ness avenue, in the heart of the city's motor vehicle row.

National Welding Co., Newark, N. J., which specializes in motor truck and passenger car repair work, has broken ground for an additional building, which will be used exclusively for the passenger car work, leaving the present structure for motor truck repairs.

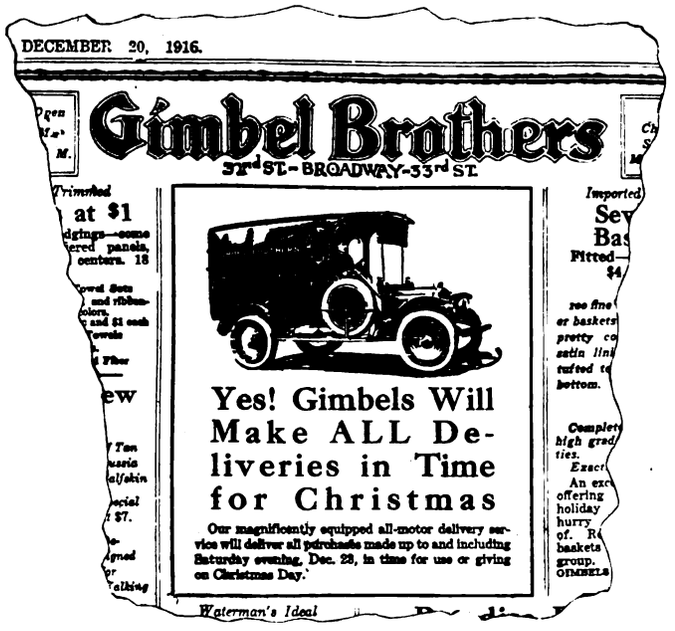
Rollin W. Hutchinson, Jr., for the past 3 years general sales and advertising manager of the Sterling Motor Truck Co., Milwaukee, Wis., and its predecessors, the Sternberg Mfg. Co. and the Sternberg Motor Truck Co., has resigned, effective February 1, 1917. He will devote himself to several manufacturing enterprises which will market efficiency-increasing auxiliaries for motor trucks. Mr. Hutchinson is the author of several books on motor truck efficiency and is reputed to have written more articles on all phases of motor trucking than any other individual not connected directly with the editorial organizations of motor truck magazines.

J. R. Morron has been elected a director and member of the executive committee of the Maxwell Motor Co., Detroit, to fill the vacancy caused by the resignation of Eugene Meyer, Jr. Mr. Morron is president and a director of the Atlas Portland Cement Co., and is also a director in the following companies: Baltimore & Ohio Railroad, Chicago, Great Western Railroad, Guarantee Trust Co., the American Surety Co., and the National Bank of the Republic, Chicago.

J. C. Brady was elected chairman of the board of directors of the Maxwell Motor Co., Detroit, and of the executive committee, in the place of J. C. Jay, Jr., Mr. Jay will continue as a director of the company and has been elected a vice-president.

The officers of the Reo Motor Car Co., Lansing, Mich., were re-elected at the annual stockholders' meeting held in Detroit on December 19. The present board of directors was also re-elected at the same time for the coming year.

C. L. Guyman, formerly in charge of the field truck representatives of the Packard Motor Car Co., Detroit, has been appointed assistant truck sales manager of the same company.



Upsetting the popularly-conceived notion that Santa Claus travels in reindeer sleds or aeroplanes, the advertisement shown herewith, clipped from one of the New York newspapers, proves that he really travels in swift and sure motor trucks. It is a great tribute to the motor truck and its ability to serve the public when one of New York's largest department stores is able to guarantee the delivery on time of all Christmas presents solely upon the basis of its all-motor delivery service

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T. J. Toner has been appointed director of sales for the Maxwell Motor Co., Detroit. He was formerly Pacific coast zone manager.

C. E. Stebbins, formerly assistant sales manager of the Maxwell Motor Co., Detroit, has been promoted to the position of assistant director of sales for the same company.

Gordon Muir has been appointed advertising manager for the Maxwell Motor Co., Detroit. He has been with the Maxwell company for the past year.

V. C. Jackson has been appointed comptroller of the Briscoe Motor Corp., Jackson, Mich. For the past 5 years he has been associated with the A. O. Smith Co., Milwaukee, Wis.

Frank S. Gardner, for the past 2 years connected with the service bureau of the Metz Co., Waltham, Mass., has resigned to join the B. F. Goodrich Co., Akron, Ohio.

Henry Lansdale has resigned as vice-president of the Denby Motor Truck Co., Detroit. He has been both vice-president and general manager of the company since its formation in 1915.

R. E. Arter has been appointed general manager of the Federal Motor Co., Providence, R. I. He was formerly a motor vehicle salesman in the New England territory.

Hoover Holton has been promoted to New England zone manager for the Maxwell Motor Co., Detroit.

William A. Baxter has recently been appointed general sales manager for the Maxfer Truck & Tractor Co., Chicago, maker of the Maxfer Ford adapter.

A. S. Blagden has been elected president of the American Malleables Co., Lancaster, N. Y., succeeding W. G. Pearce, who has been made chairman of the board. This company specializes in malleable iron castings for the motor vehicle industry.

E. S. Christiansen will become manager of the Detroit office of the United Smelting & Aluminum Co., New Haven, Conn. He was formerly purchasing agent. W. T. Schmitt, formerly of the Bosch Magneto Co., has been appointed assistant manager at the Detroit office.

B. N. Jones, in charge of the industrial department of the Otis Elevator Co., New York City, has been appointed manager of the Harrison, N. J., plant of the concern, which is to manufacture worm-driven axles and steel wheels for motor trucks, as described and illustrated elsewhere in this issue.

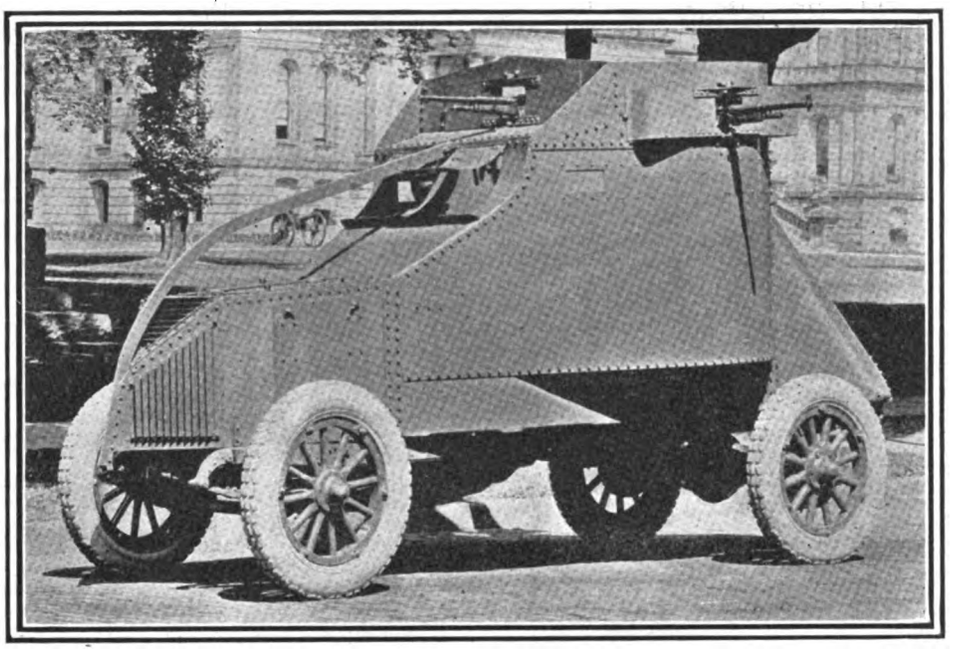
P. S. Tice, formerly chief engineer for the Holley Carbureter Co., is working with F. E. Watts, chief engineer for the Hupp Motor Co., in the development of carbureters to use low-gravity fuel.

F. F. Tilden, formerly city salesman at the Indianapolis, Ind., branch of the Goodyear Tire & Rubber Co., Akron, Ohio, has been appointed manager of the same company's branch at Columbus, Ohio. He succeeds W. W. Magill, whose new position will be announced later.

W. S. Boone, formerly manager of the Scranton, Pa., branch of the Goodyear Tire & Rubber Co., Akron, Ohio, has recently been appointed supervisor of sales for the same company in Philadelphia, Pa.

W. G. Starnes has been appointed manager of the Atlanta, Ga., branch of the Goodyear Tire & Rubber Co., Akron, Ohio, succeeding J. E. Taylor, who has been transferred to the dealers' help division of the tire department at Akron.

H. Walters, formerly city salesman for the Goodyear Tire & Rubber Co.'s Atlanta (Ga.) branch, has been appointed resident salesman at Nashville, Tenn.



Designed and built by the Reo Motor Truck Co., Lansing, Mich., and mounted on a Reo 1,500-pound truck chassis, the armored motor vehicle shown above is protected by two thicknesses of steel, separated by an air space. This unusual construction was used in order to reduce the weight of the armor, it having been found by experiment that two thin plates sufficiently thick to stop the passage of a bullet through the inner one at any given range weigh less than one plate necessary under the same conditions. In the first case the bullet passed through the outside plate, but in doing so was flattened so that the inner plate stopped it. While the two-plate construction seems very advantageous in reducing weight, it can be deduced that any considerable penetration of the outer plate would expose the thin inner one to fire which it could not withstand. In this case, a new outer skin would have to be provided. The body is designed to accommodate four machine guns and their operators in addition to the driver. It is entered through a steel door at the rear. The radiator is guarded by a V-shaped protection with shutters and the motor accessibility arranged for by large hinged plates on the hood sides. The complete vehicle is said to weigh 4,200 pounds and to be capable of a speed of 35 miles per hour. The truck was recently presented to the Michigan National Guard by the Reo company

F. W. Nason, formerly manager of the Rochester, N. Y., branch of the Goodyear Tire & Rubber Co., Akron, Ohio, has been transferred to the export department at the Akron plant.

A. E. Pearce has been elected president of the Pearce Tire and Rubber Co., Germantown, Pa., succeeding J. L. Smith, resigned. H. J. Atwood was elected secretary-treasurer in place of P. C. Remick, resigned. The following directors remain on the board: A. E. Pearce, H. J. Atwood, J. L. Smith and F. L. Kerr. A. W. Green resigned from the board.

Officers of the Bucyrus Rubber Co., Bucyrus, Ohio, were elected at the plant of the company on December 14. Phillip Heater was elected president, to succeed R. O. Perrott, who resigned 6 months ago. The remainder of the officers selected for the year are as follows: George Donnenwirth, vice-president; C. P. Mader, secretary, and W. A. Blicke, treasurer.

S. B. Taylor, sales manager of the S. K. F. Ball Bearing Co., Hartford, Conn., has been appointed vice-president of the concern, succeeding F. B. Kirkbride. The latter will remain on the board of trustees of the concern and Taylor will remain in charge of the sales.

G. A. Ungar has been appointed chief engineer and technical manager of the S. K. F. Ball Bearing Co., Hartford, Conn. He succeeds Uno Forsberg, who has returned to Sweden after completing his work of organizing the manufacturing department of the S. K. F. company in this country. Ungar was previously the representative for the company in Cleveland, Ohio; Detroit, and Pittsburgh, Pa.

John F. Renfro has been appointed eastern sales agent for the Sparks-Withington Co., Jackson, Mich., makers of radiator fans, horns and various other motor vehicle accessories. He will make his headquarters at 1834 Broadway, New York City, and will have charge of the territory comprising the states of New York, Pennsylvania, New Jersey, Maryland, Virginia and the District of Columbia.

Russell Baldwin has resigned as eastern representative of the Stewart-Warner Speedometer Corp., Chicago. He will be succeeded by F. H. Martin, who has previously represented the company in the eastern states. Martin will continue to make his headquarters in Detroit.

Guy Core has resigned as advertising manager of the Sparks-Withington Co., Jackson, Mich., to take a similar position with the Springfield Body Co.

William F. Jennings has been appointed eastern sales manager for the Bound Brook Oil-less Bearing Co., Bound Brook, N. J. He will also serve as advertising manager. He has been connected with the Bound Brook organization for the past 3 years.

Johns-Manville bonus of 10 per cent of each employe's yearly salary was decided upon at a recent meeting of the directors of the H. W. Johns-Manville Co., New York City. All employes who have been with the concern for 1 year will share in the bonus.

A Republic Co-operative Store has been organized by the 900 employes of the Republic Motor Truck Co., Alma, Mich. The new store will purchase and sell every kind of merchandise at a price sufficiently above cost to cover running expenses.

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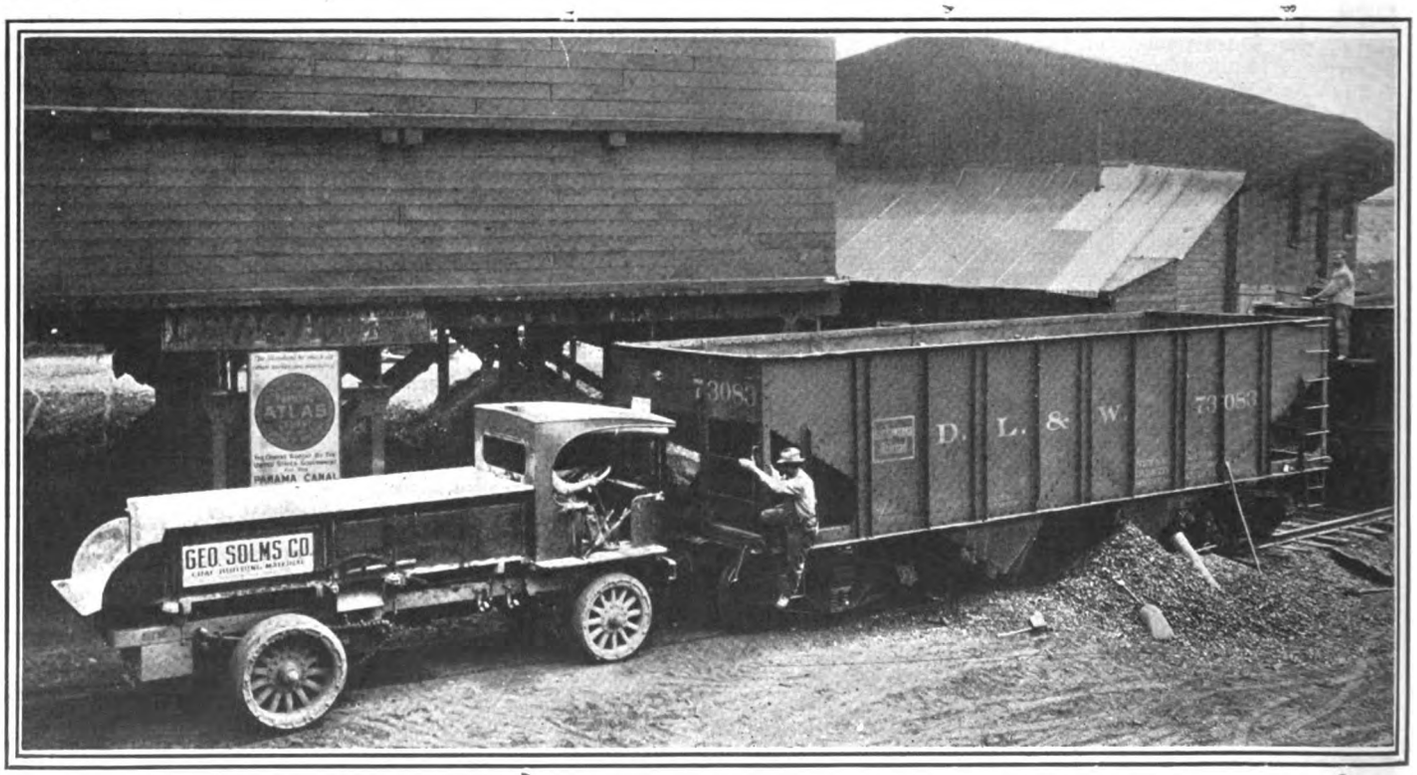
First Get-Together Wichita Truck Dinner, at which the office force of the Wichita Falls Motor Co., maker of Wichita trucks, was present, was held on December 11 at the Westland Hotel, Wichita Falls, Tex. The principal speakers of the evening were J. G. Culbertson, general manager; C. Y. Tully, assistant general manager, and Hugh G. Cargo. Arturo Rodriguez of Bolivia, representing a large transportation concern in that country, was also present. He is making a several weeks' study of Wichita trucks at the latter company's plant to become well acquainted with their construction, so that he will be well prepared to supervise a large fleet of such trucks to be put into operation in Bolivia. One of the features of the gathering was the novel plate cards used. These were made up of small 5 by 7 inch Van Dyke blueprinted sheets, one of which contained the menu and twenty-three others of caricatures of the members present. As one result of the meeting it has been decided to hold regular assemblies for the purpose of discussing Wichita manufacture, production and such other subjects as may prove beneficial to the organization.

"Handy Atlas of the World" is the title of a very well gotten up atlas printed by the Matthews-Northrup Works, Buffalo, N. Y., for the Russel Motor Axle Co., North Detroit, and issued by the latter company. The book is of convenient pocket size, 5¼ by 7¼, and contains thirty-six pages. The book gives colored maps of the six continents of the world, together with maps of the United States, Great Britain, France, Germany, and practically all of the other countries of the world. The atlas is well indexed on the title page, and contains a table of the population of the principal cities of the world according to the 1910 census. It also gives tables showing the area and the population of the various states of the United States, its outlying territories, and the areas and population of the countries and principal divisions of the rest of the world. The maps are entirely free of advertising matter, the name of the Russell company appearing only twice in the entire book, once on each of the front and back covers, the latter also having an exterior view of the Russel internal-gear-driven axle for motor trucks.

The Electric Vehicle Field in Costa Rica will be increased by the installation of a motor-generator set, the contract for which has just been placed by an import firm in San José, Costa Rica. The equipment will be used for charging storage batteries. The electricity for the operation of the set will be secured at small cost from one of several hydro-electric plants now built and in service. It is expected that the new equipment will aid greatly in the sale of electric passenger vehicles and motor trucks, as gasoline sells at 45 cents, United States currency, a gallon in San José. No electric vehicles are in use there at the present time because no concern has heretofore been equipped to charge batteries. Although only a few miles of roads are at present passable for heavy trucks, the government is progressing rapidly in its new road construction, and it is expected that these new roads, together with the battery-charging apparatus, will result in a demand for electric vehicles for both freight and passenger service. At the present time there are about fifteen motor trucks in the service of the government and of several of the largest importing houses.

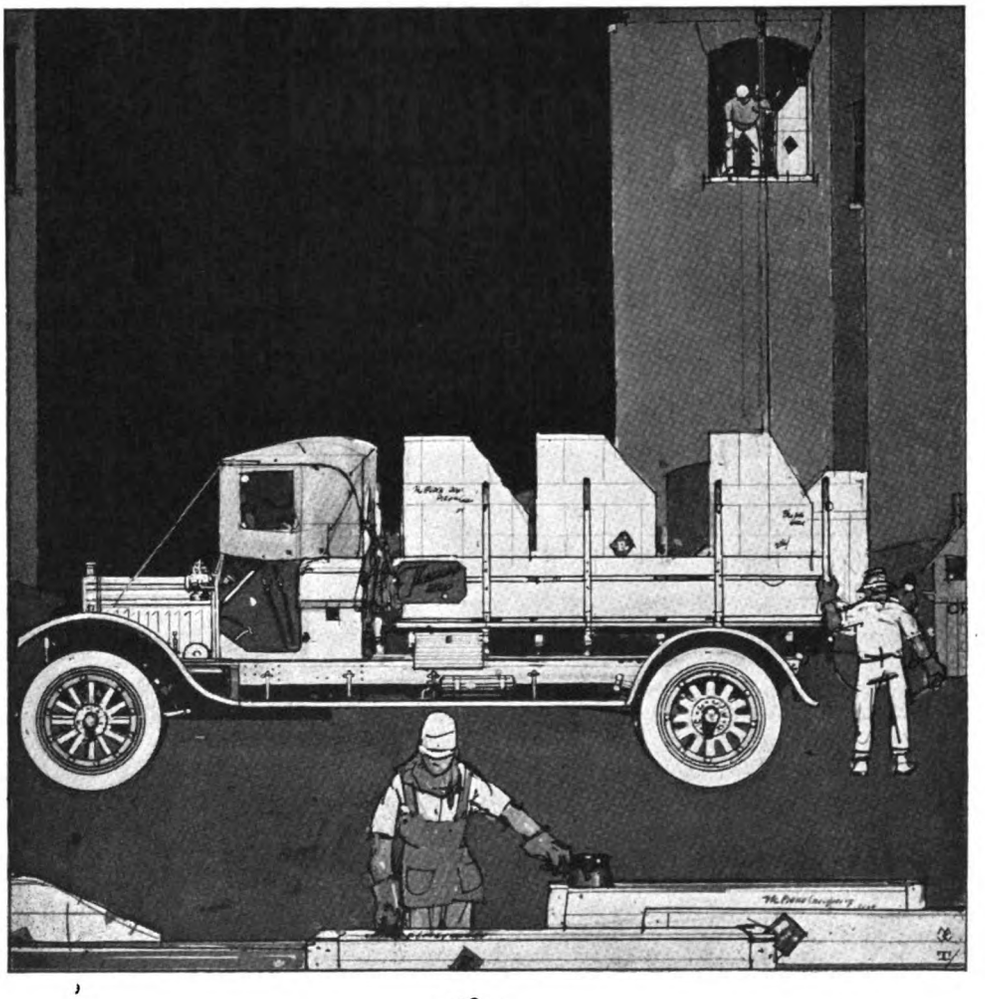
Small Motor Trucks Are in Demand in Spain, according to a merchant there who is desirous of representing an American manufacturer of light commercial vehicles in that country. Payments for vehicles purchased will be made against shipping documents, and the merchant can furnish references. Further information may be had from the Bureau of Foreign & Domestic Commerce, Washington, D. C., or from any of its branch omces throughout the country. Refer to Trade Opportunity No. 23259.

"Devices That Make for Motor Truck Efficiency" is the title of a sixteen-page booklet just issued by the B. F. Goodrich Co., Akron, Ohio. The material given is a reprint of a portion of Vol. IV, 1916, issue of "Motor Trucks of America," an annual publication of the Goodrich company. The reprint points out that the efficiency of a motor truck depends to a great extent on the manner in which it is loaded and unloaded and the way in which the deliveries are made. It further divides the means for increasing motor truck efficiency by keeping the vehicle in motion for the greatest possible part of each working day into devices that assist loading, those that expedite unloading and those that increase the carrying capacity. The remainder of the catalog is then given over to descriptions of the various mechanisms under the three heads just mentioned. These include demountable bodies and sectional, trunk and nest bodies which can be loaded into the vehicle body quickly, either on rollers or by means of gravity conveyors. It quotes an article dealing with the demountable bodies used by the Curtis Publishing Co., Philadelphia, Pa., as described in THE COMMERCIAL VEHICLE of Nov. 15, 1915. The subject of special bodies for trucks and the use of trailers is also taken up. The book should prove of great value to all those users of trucks who desire to increase their vehicles' efficiency.



Besides performing its conventional task of delivering coal and building materials, the 5-ton Garford truck pictured in the above illustration also pushes freight cars around the yard of its owner. In large depots like that used by the George Solms Co., Richmond Hill, L. I., who also owns the truck shown above, it is often necessary to move loaded freight cars, which come in in a string of five or six, from place to place in order to unload them. This car spotting was formerly done by moving them along by pinch bars. This required the services of two or three men and was very slow into the bargain. A salesman of the R. E. Taylor Corp., Garford distributor in the Metropolitan territory, happened along and saw the men pinching the cars along and suggested that the truck be used instead. The method was tried and proved so expeditious that whenever the truck is ready to be loaded it does not wait until the freight car is pinch-bared into position but pushes it there itself. It then runs around to the freight car door, gets its load and is off without delay

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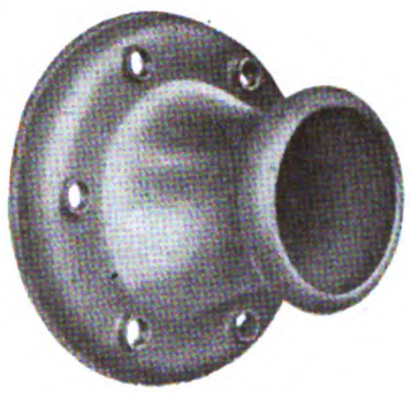


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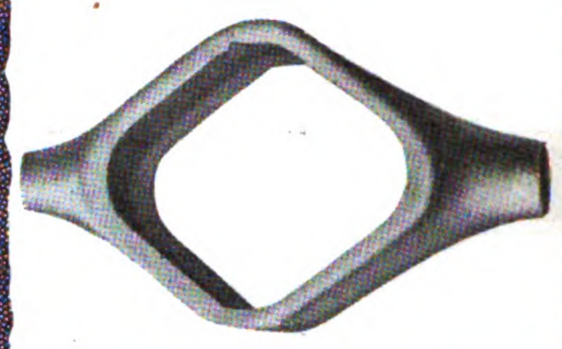
While predominating in the total number of motor trucks annually put into service in this country, most of the White output is absorbed by repeat orders from satisfied users—regardless of price competition.

THE WHITE COMPANY
CLEVELAND

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BOSSERT PRODUCTION COST

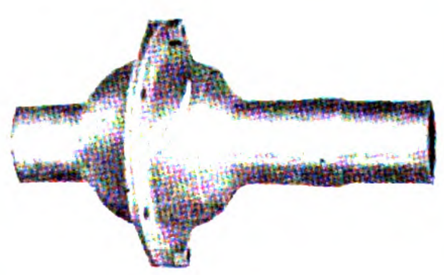


The use of pressed steel parts in place of malleable iron, steel castings or drop forgings will lower production cost and decrease weight without lessening strength in any way.

There are many parts in a truck where this change can be advantageously made.

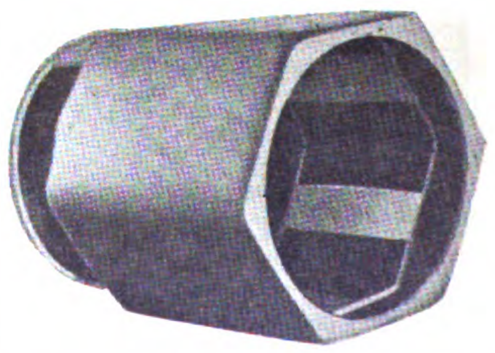
THE BOSSERT WAY

In the most modern plant which brains, money and experience can devise, we make over 200 pressed steel parts. Send us a sample of your spring hangers, running boards, brake drums or a score of other parts and our engineers will demonstrate to you an equal or better product at a lower cost.

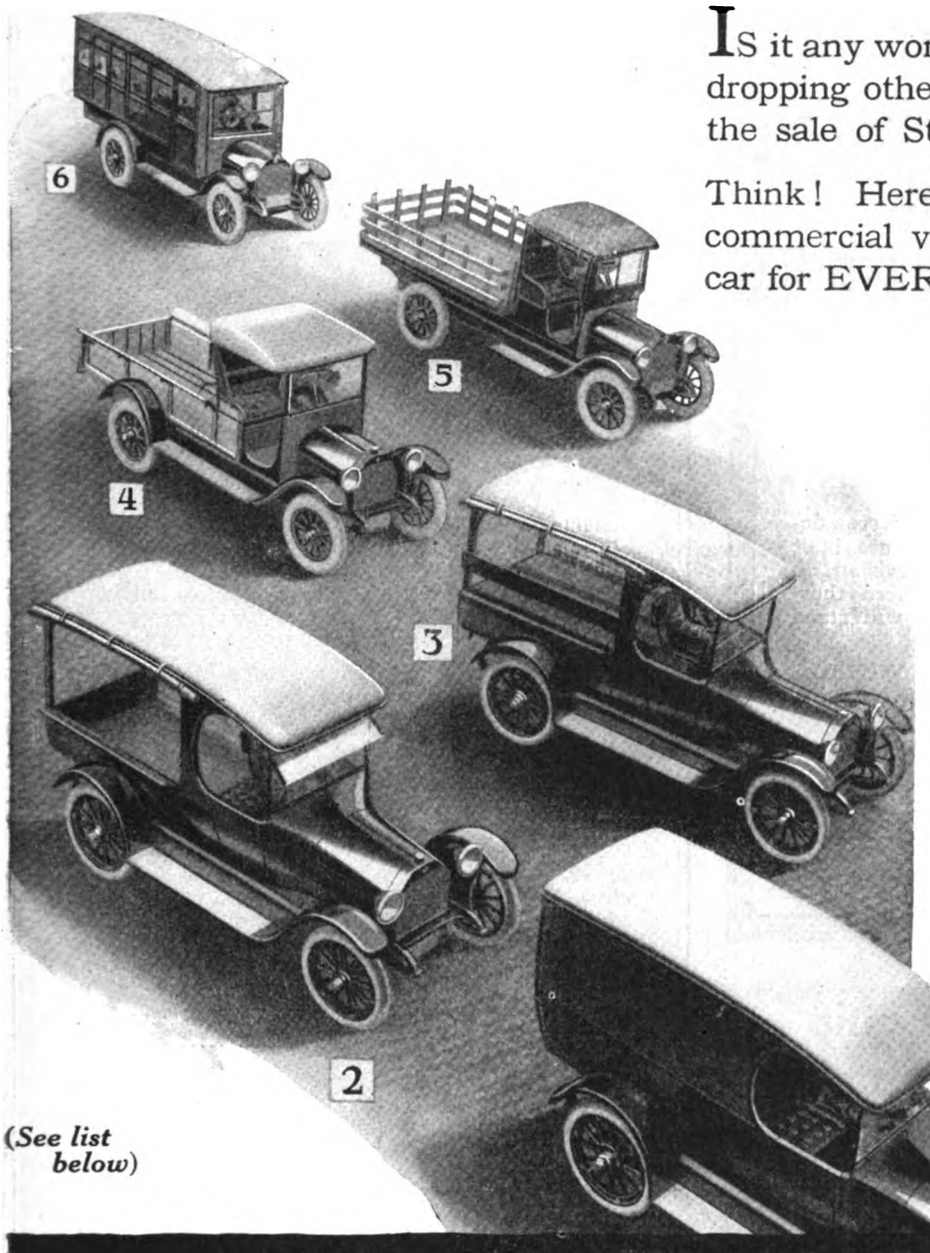


The Bossert Company

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Studebaker

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Commercial Cars

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2.	Express Car	900
3.	Station Wagon	925

ONE-TON CARS

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5.	Stake Body	1350
6.	Bus, 16 passenger	1500

F. O. B. Detroit

The opportunity that the sale of Studebaker Commercial Cars offers a progressive man can not be over-estimated. The use of motor vehicles in every line of business is increasing day by day. And to the men who get into the market EARLY, the opportunities are limitless. We invite every energetic man who looks ahead to building a lasting business, to write at once for complete information.

STUDEBAKER

South Bend, Ind. Detroit, Mich. Walkerville, Ont.

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"Patent Pending"

Are used by America's leading Truck Builders

These wheels were designed by, and are built under the supervision of, experienced engineers. They have been thoroughly tested and have proved they will stand hard usage and abuse.

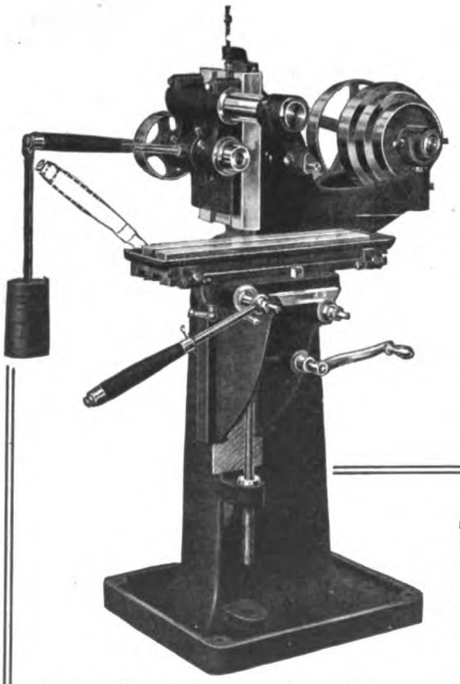
Over 25,000 WEST'S CAST-STEEL WHEELS are now used on trucks and **not one of them** has failed to give satisfaction. Specify WEST'S CAST-STEEL WHEELS on every heavy truck you buy.

SATISFACTION GUARANTEED

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"Watch the West Cast-Steel Wheels Go Round"



Equip Your Garage With a Whitney Hand Miller

so you won't have to turn away profitable repair business, or turn it over to the machine shops.

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The Whitney Mfg. Co., Hartford, Conn.

Chains, Keys, Hand Milling Machines

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Also pole, semi, and pleasure car trailers.

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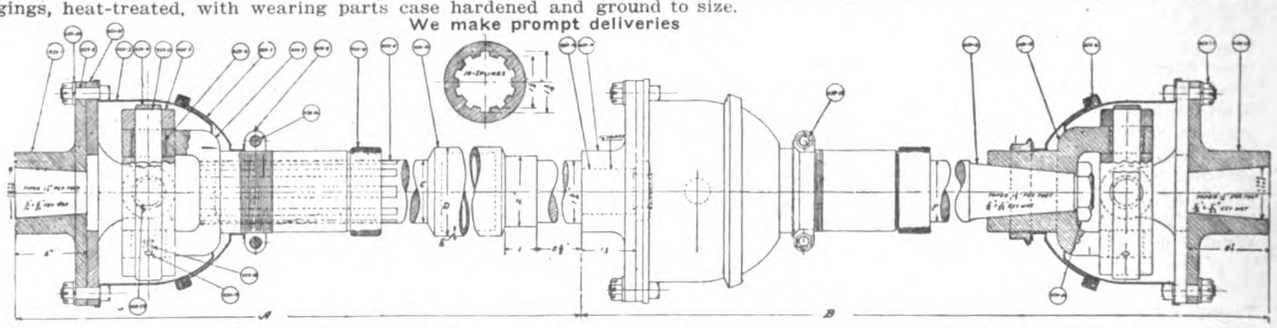
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CHAMPION
DROP FORGINGS



DETERMINATION!

Consider the Bull Dog. He is the embodiment of the spirit of determination, for he generally *does* what he undertakes to do. Champion delivered-on-time Forgings *do* satisfy rigid requirements, because, back of them stands an organization which is determined to produce such Forgings and such Forgings only. But at a sensible cost

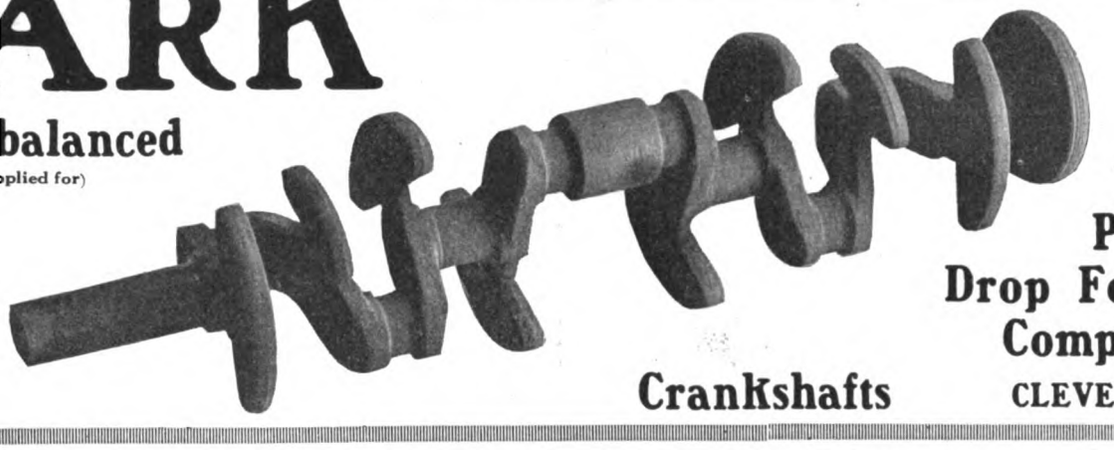


New York Office: 30 Church Street — Chicago Office: Monadnock Bldg.

The Champion Machine & Forge Co.
CLEVELAND, OHIO

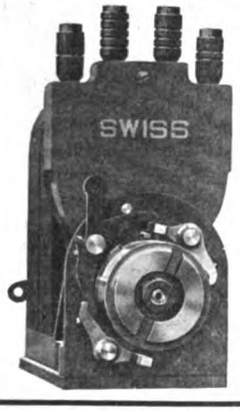
Philadelphia Office: Bourse Bldg. — Detroit Office: H. B. Kendal, 56 Cadillac St.

PARK
Counterbalanced
(Patent Applied for)



The Park Drop Forge Company
Crankshafts CLEVELAND

TO MANUFACTURERS:



DON'T RUIN YOUR REPUTATION FOR THE SAKE OF A FEW DOLLARS

You think you save by installing cheap ignition.

You are bound to be found out by the owner—you know it—and sooner or later *you* will be the heavy loser.

The Swiss Magneto Costs You a Little More—but Gives the Best Ignition

It gives the Hottest Spark, the Most Accurate Timing and the *Only* Perfectly Reliable Ignition under *all* conditions. Time and again it has stood *100% perfect* under the most severe, prolonged and varied tests by impartial boards of engineers.

The Swiss Safety Starting Coupling Absolutely Preventing Backkicks from Pre-Ignition Is Exclusive On The Swiss

Write or wire today for further information, prices, etc., in Bulletin No. 2 C.

SWISS MAGNETO COMPANY
208 So. La Salle Street Chicago

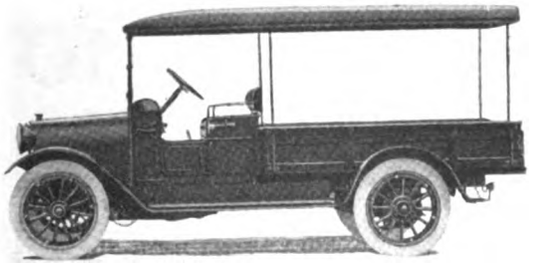
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Gives You
BOTH A TRUCK AND A TRACTOR FOR THE PRICE OF A TRUCK

Ask a Fifth Wheel user about his increase in tonnage capacity and decrease in ton-mile costs

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SPRINGFIELD, MASS.

THE TRUCK SENSATION OF THE YEAR



The new REO 1500-pound "Speed Wagon"

$1000 F.O.B. Factory

REO MOTOR TRUCK COMPANY
LANSING, MICH., U. S. A.

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Real Value

THE KREBS COMMERCIAL CAR CO. CLYDE, OHIO U.S.A.

You get the full value of your money and more when you invest in a KREBS Truck.

Guaranteed by manufacturers with 16 years' experience in motor vehicle construction, the KREBS combines Simplicity and Low Maintenance with Efficiency and Reliability.

It contains a simple, powerful Continental Motor, a Timken-Brown Worm Drive, Renault-type Radiator. The special KREBS Carburetor economizes your fuel and the KREBS Automatic Governor protects you against careless-

Krebs

ness and recklessness. The KREBS can be safely entrusted to an ordinary driver.

KREBS Trucks are made in 1½, 2, 3 and 5-ton capacities. Body to suit requirements.

Send for KREBS catalog.

The Krebs Commercial Car Co.
Clyde, Ohio, U. S. A.



"Get the Quality" **Booth** "Get the Quality"

IF you buy felt washers simply by the price, you can always find some that are lower priced than ours. But if you care for quality, service and perfection, BOOTH'S are the lowest priced washers made.

BOOTH FELT COMPANY, Inc.

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Making haste **safely**, when haste is necessary, is the assurance Thermoid Brake Lining gives the owner of the truck.

For Thermoid Brake Lining means that the brakes will always grip—hold them in a steady, unyielding friction-grasp—till the truck stops on the safe side of danger. This, no matter what the speed, what the load or how steep the grade.

Thermoid Brake Lining is superlative in amount of raw material. Weight proves this.

Thermoid
HYDRAULIC COMPRESSED
Brake Lining-100%

Thermoid is made of best grade, long fibre, Canadian asbestos spun on brass wire. This material is impregnated with a friction compound impervious to heat, water, oil, gasoline and dirt. It is folded and stitched and then, under hydraulic pressure, welded into a single, solid mass.

Thermoid will grip when worn paper-thin.
It is friction from surface to surface.
It is guaranteed to be this and to do this.

Thermoid Rubber Company Trenton, N. J.



Creating New Markets

United Trucks are today setting the pace in the heavy duty field. Dealers who have the good fortune to handle United Trucks have something besides mere strength and power to sell.

They have real hauling service plus ideas for reducing hauling expense.

Our special body service is so broad in its scope and we work in such close co-operation with our dealers that **any hauling proposition** can be undertaken with perfect assurance of its successful solution.

If that is the kind of a proposition you want to tie up with and you mean business, write or wire us regarding terms and territory.

United Trucks are made in 2, 3½, 4 and 5 ton sizes—all worm drive. Every mechanical feature well known by name and reputation.

UNITED MOTORS COMPANY
672 North Street Grand Rapids, Mich.

United Trucks

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Lenox American TRACTOR

For EFFICIENCY

For six years the Lenox "American" has been developing to the point of to-day's perfection. The experiments have been at *our* expense, *not* the *purchasers'*.

By *practical and continuous use* we have proved that the Lenox "American" is the *last word in tractor construction.*

DEALERS AND PROSPECTIVE BUYERS,
Note these *two special features—4-wheel Drive and 4-wheel Steer.*

Write us for prices and further information

LENOX MOTOR CAR CO.

Hyde Park Station **BOSTON, MASS.**

Where Is the Hoist



On This Dump Truck?

IT'S THERE, ALL RIGHT, A

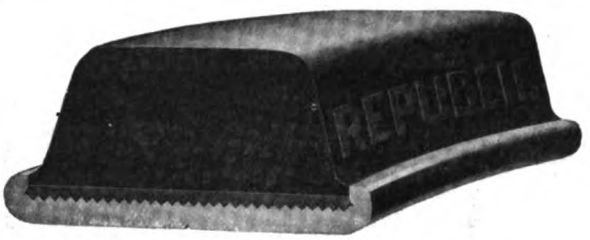
YOUNG TRADE HORIZONTAL HYDRAULIC MARK

Body no higher than truck seat; best load distribution; no lost space.

Catalog For the Asking

YOUNG PATENT HOIST CO.
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ANOTHER
Republic Triumph



REPUBLIC PRODIUM TRUCK TIRES

The Famous Prodium Process of compounding rubber, discovered and used exclusively by the Republic Rubber Company is now being used in making Republic Motor Truck Tires.

This process produces a rubber stock that is unequalled for resiliency and wear resistance.

It is so tough and strong that its tensile strength per square inch exceeds that of any other solid tire compound by 1000 pounds.

Its abrasive qualities are unequalled. A piece of Prodium Rubber held against an emery wheel will wear off much more slowly than any other truck tire stock manufactured.

These tires are practically chip proof. This most troublesome fault of solid tires is eliminated. They retain their smooth, even surface to the last mile.

In addition to these qualities Prodium Rubber is unusually light in weight.

In actual road tests under the severest conditions these tires have averaged 12,000 to 14,000 miles each.

This makes a tire that is unequalled for efficiency, economy and service.

Made in all sizes, both Channel Base Pressed-on Type and Flange or Demountable Type.

See nearest Repubic Dealer or write us for further details before you purchase another truck tire.

Manufactured by

The Republic Rubber Company

Youngstown, Ohio

Makers of the Famous STAGGARD Trade Mark Registered U. S. Patent Office TREAD TIRES

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MACCAR

Delays Cost Money

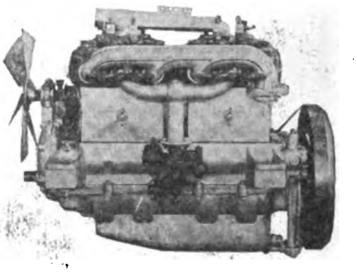
The MACCAR never stays off the road more than 30 minutes, because of power-plant trouble.
If anything happens you substitute a new power-plant—no expensive tying up of your truck for time-consuming repairs.
The motor, clutch, transmission, radiator, pump, magneto, carburetor, dash and toe boards, brake and foot pedals, steering gear and all spark and throttle controls, are assembled dust-proof, in one cradle and as a Unit mounted into the frame.
Dealers will find in the MACCAR AGENCY a new and profitable proposition. Write now for details.

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Pitts Motor Car R & S Corp., 540 Atlantic Ave., Brooklyn, N. Y.; Maccar Sales Co., 2116 Market St., Philadelphia, Pa.; Bee Automobile Co., 15 N. Church St., Allentown, Pa.; R. G. Boyle, 210 10th St., Jersey City, N. J.; Britton-Stevens Motors Corp., 52 Binney St., E. Cambridge, Mass.; W. E. Higgins, 151 Whitmarsh St., Providence, R. I.; Maccar Sales Corporation, Scranton, Pa.; The Maccar Sales Company, 7 Pine Ave., Albany, N. Y.



MACCAR TRUCK CO.
SCRANTON, PA.



Beaver Motors Make Their Way By The Way They Are Made

BEAVER MOTORS are made by truck motor specialists. The concentrated experience of engineers of international reputation is embodied in their construction.

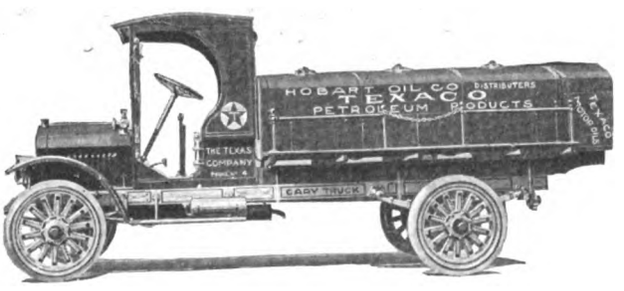
BEAVER TRUCK MOTORS are made by men who make nothing but motors—who, by doing the same thing over and over have become masters in perfection. That is why we can make truck motors better, quicker, and at less cost than the truck manufacturer himself.

We make truck motors of all sizes, for all requirements. No matter whether you are building a 1,500 pound light delivery wagon or a 5-ton truck, we can meet your demands for power, economy and dependability.

Do not determine on a motor for your truck till you have sent us your specifications.

BEAVER MFG. COMPANY
Milwaukee Wisconsin

The
Gary Motor Truck Company
Manufacturers of
Gary Worm Drive
MOTOR TRUCKS



5 MODELS *5 CAPACITIES*
¾ Ton 1 Ton 1½ Ton 2 Ton 3 to 3½ Ton

Complete 1917 Catalog will be mailed Promptly on Request

General Offices:
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610 BROADWAY *GARY, INDIANA*

United States 'Solid Truck' Tires



Truck Tire Efficiency

Our new, secret process compound, vulcanized under a pressure of 1,600,000 pounds (almost four times the pressure used to vulcanize ordinary truck tires) has more vitality, rugged strength and durability than any other compound manufactured.

For this reason, United States Solid Truck Tires are the strongest and most durable now on the market.

United States Tire Company
1790 Broadway, New York City

UNITED STATES RUBBER COMPANY
US
RUBBER STATES
AND ASSOCIATED COMPANIES

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Standard

MADE IN DETROIT USA

Motor Trucks

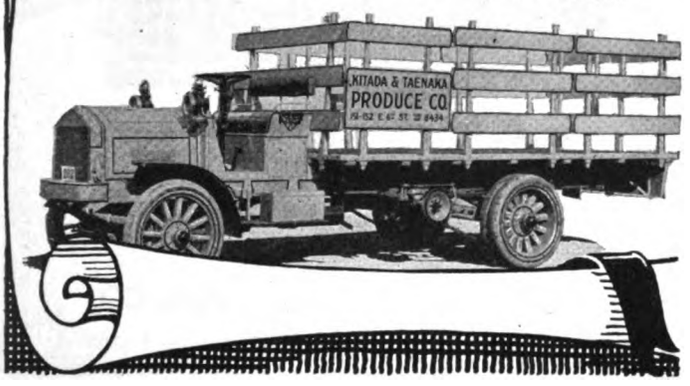
Startled the Motor Truck Industry By a Unique Sales Plan

First of all, the Standard is an unusual truck. It is a powerful combination of many of the world's best-known units—the Continental Motor; Timken Axles; Timken Bearings; Brown-Lipe Gears, and other well-known standard parts

The Standard Motor Truck is sold in an unusual way. Any responsible person can be the agent for the Standard, with absolutely *no investment—no deposit* and *no contract.*

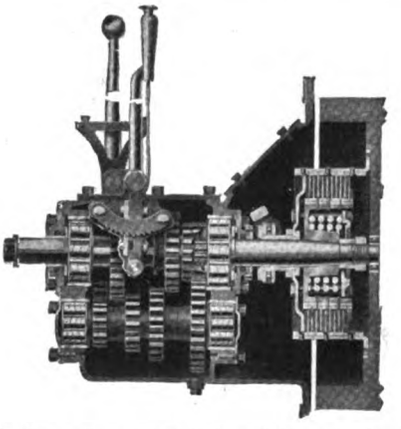
Write for details of this plan. *No obligation.*

STANDARD MOTOR TRUCK CO., 315-327 Bellevue Ave. Detroit, Mich.



COVERT COVERT COVERT

TRANSMISSIONS

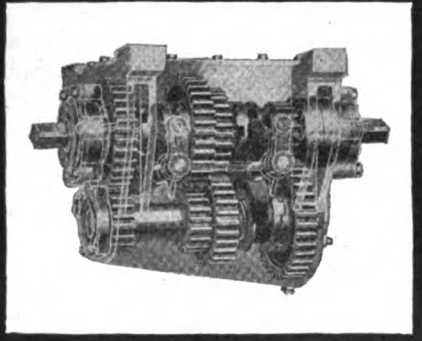


Made in various models for different sizes and types of cars—Covert Transmissions will free you from transmission troubles. Let us show you how they fit your construction.

Covert Gear Company, Inc.

Sales Office, Detroit, Mich. Factory, Lockport, N. Y.

COTTA TRANSMISSIONS

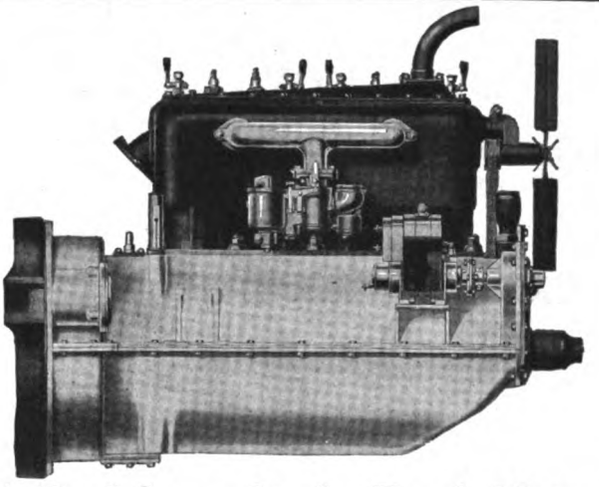


All Gears Always in Mesh

ROCKFORD

An Assurance of Dependable Service

The Cotta Transmission Co. Rockford, Ill.



A Real Long Stroke Truck Motor

Type T U, 4 x 6; Type U U, 4½ x 6; cylinders interchangeable. Crankshaft, four bearing, chrome nickel steel, 2 in. diameter. Bearings, bronze, Fahrig metal lined. Camshaft, one piece, cams integral. Oiling system, force feed, hollow crankshaft.

WRITE FOR COMPLETE SPECIFICATIONS.

WISCONSIN MOTOR MFG. COMPANY

Station A, Dept. 319 MILWAUKEE, WIS.

New York Branch: 50 Church Street. T. M. Fenner, Factory Representative. Pacific Coast Representative: Earl P. Cooper Co., 1428 Bush Street, San Francisco; 333 West Pico Street, Los Angeles.

Wisconsin CONSISTENT Motors

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Mack TRUCKS

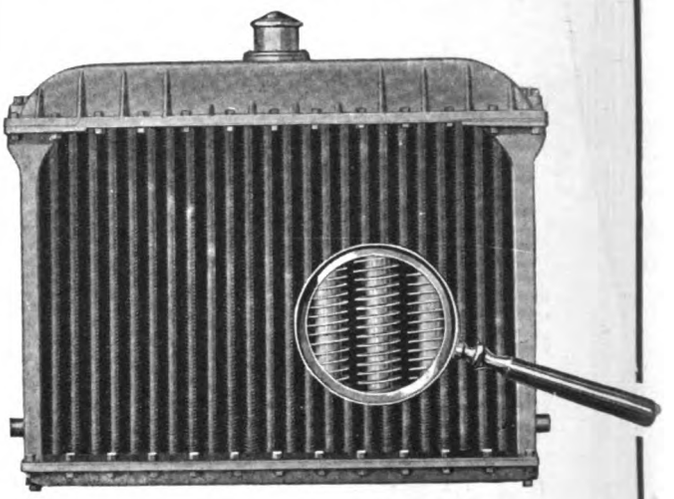
MACK heavy duty trucks are constructed soundly along sane mechanical lines. They are powerful, durable machines, built with a large margin of reserve strength that makes the accomplishment of an ordinary job a surety, and the most difficult task a fact.

"Performance Counts"

Complete line 1, 1½, 2, 3½, 5, 5½, 6½, 7½ *tons. Tractor trailers 5 to 15 tons.*

INTERNATIONAL MOTOR CO.
NEW YORK

Seamless Copper Helical Tube Cooling Sections



Are Guaranteed for the Life of the Motor on Which They are Installed

Helical Tube Construction is Accepted as the Best by the Leading Truck Makers of America

Manufactured only by

ROME-TURNEY RADIATOR CO.
ROME, NEW YORK

DIAMOND T TRUCKS

Diamond T Service is as thoroughly built into our ¾-ton trucks, the smallest of the line, as it is in our 3½ ton model.

Its low cost is made possible only by its wide popularity which has enabled us to produce this model in enormous quantities. There has been no cheapening of quality or inferior workmanship permitted in its design or construction.

For a thousand uses it is the most satisfactory and economical delivery vehicle ever marketed. With a body suited to your requirements, it will improve your delivery service while lessening your operation expense.

Write to-day for catalog.

Diamond T Motor Car Co., Chicago, Ill.



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NORTH AMERICAN MOTORS

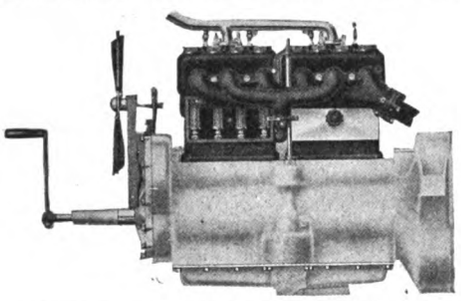
This is to announce two new models which have been added to the "N. A." line. They are: Model C, developing 20-25 H.P., and Model CX, developing 25-30 H.P.

These motors round out a line of power plants for commercial vehicles which are the most thoroughly accessible and simplest truck motors ever designed.

Full information on these new models or on our entire line will be gladly sent.

A Detroit office has been opened at 1325 Dime Savings Bank Building.

NORTH AMERICAN MOTORS COMPANY
Factory: POTTSTOWN, PA.
Detroit Office: 1325 Dime Savings Bank Bldg.



"Little Giant"



The Power-Bred Truck

MECHANICAL power is bred into the Little Giant Trucks of today—just as strength and endurance were bred into the Percherons of the past. The Little Giant is lively, responsive, like a fine-spirited horse—yet, like a young Mogul Locomotive, it is dependable twenty-four hours in twenty-four. Thousands of Little Giant owners proudly boast—"it never had a tow-rope on it yet."

THE "LITTLE GIANT" LINE INCLUDES

Model 15—1-ton Worm Drive
Model H—1-ton Chain Drive
Model H—1½-ton Chain Drive
Model 16—2-ton Worm Drive

Special Bodies for Every Purpose

Agents wanted for desirable territory

CHICAGO PNEUMATIC TOOL COMPANY
1085 Fisher Bldg. CHICAGO — 52 Vanderbilt Ave. NEW YORK
Branches and Service Stations Everywhere

DENBY TRUCKS

FOR TRAIL OR PAVEMENT

THE wonderful esteem in which the buying public holds the Denby truck is an asset of great value to the Denby dealer.

This public esteem—based originally on the known successes of the men in the Denby organization—has been intensified by the remarkable performance of the truck itself, under the severest service conditions.

Today the dealer finds no argument necessary to demonstrate Denby quality to his customers. It is admitted; and sales follow the line of least resistance.

Four models—1 ton to 2½ tons. Body and chassis modifications to suit various lines of business.

Write us regarding your territory or we'll be glad to see you at the factory.

Denby Motor Truck Company

Dept. K, Detroit, Michigan



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In the development of the Electric vehicle,

one of the great problems that arose was that of overcoming the friction and wear of motor bearings and the troubles that naturally followed throughout the power producing and transmitting elements.

In the progress towards perfection, the use of

NEW DEPARTURE BALL BEARINGS

AMERICAN MADE FOR AMERICAN TRADE

has demonstrated the wisdom of the builders who first installed them and of the multitude of those, who, following the lead of the pioneers in the industry, have since installed New Departures in a constantly growing majority of American-made electrics.

November 2, 1916 THE COMMERCIAL VEHICLE 49

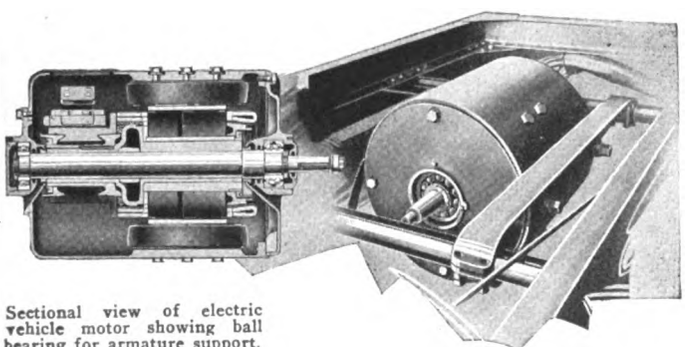
Electric Truck Troubles and Means Taken to Eliminate Them

PAPER READ BY F. E. WHITNEY AT CONVENTION OF THE ELECTRIC VEHICLE SECTION, N. E. L. A. AT CHICAGO LAST MAY

BALL BEARINGS IN COMMERCIAL APPLICATIONS

is a book that will tell you all about it.
SEND FOR A COPY.

"*Motors.*—The earlier motors were patterned directly from the street railway motors in use at that time, but, due to the more exacting requirements on account of small gearing and closer limits required, considerable difficulty was experienced with the motors with plain bearings lubricated with grease boxes. The trouble was principally felt on gear-driven trucks, which were in vogue at that time. The wear of the bearings would allow the gears to separate far enough to cause rapid wear and frequent breakage, with the consequent trouble of teeth breaking off and lodging between the gears, bending shafts and doing other damage. With the adoption of ball bearings these troubles were eliminated.



Sectional view of electric vehicle motor showing ball bearing for armature support.

Showing ball bearing in place in motor housing.

THE NEW DEPARTURE MFG. CO.

BRISTOL, CONN., U. S. A.

Conrad Patent Licensee.

WESTERN BRANCH: 818-20 FORD BLDG., DETROIT, MICH.

Distributors in trade centers throughout the United States. Sole British Agents: Brown Bros., Ltd., London and Manchester. For Continental Europe: Jacob Holst, Copenhagen, Denmark.

Garford

MOTOR TRUCKS

Garford Trucks range from one ton to six tons in capacity.

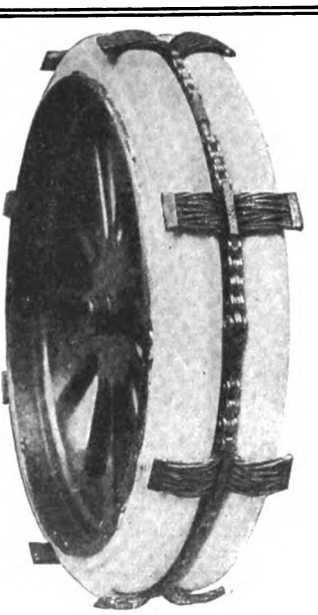
They are designed and built by men who have spent their lives in the study of motor trucks.

They are backed by one of the strongest organizations in the industry.

Bodies are provided to meet all requirements.

Write for catalog. Please address Dept. 103

The Garford Motor Truck Co., Lima, O.



Prepare Now For Winter!

Don't wait until the real cold weather sets in and the streets are covered with ice and snow, before getting "NEVER - SKIDS" for your motor trucks.

THE NEW TYPE

NEVER-SKID

practically eliminates vibration

Does away with skidding and affords positive traction on slippery streets. The cross-pieces are made of the finest quality woven steel wire — strong enough for the heaviest machines made.

The device can be applied in a few minutes without jacking up the truck, and there is no danger of its catching in driving chains or damaging tires.

YOU WILL SURELY NEED "NEVER-SKIDS" this winter.
Why not get them now?
Folder and prices will be gladly sent

NEVER-SKID MFG. CO.

122 Liberty Street, New York, N. Y.
New England Distributor: WILLARD B. DAVIS, 39 Danforth Street, Fall River
Chicago Distributor: FRED ALLEN AUTO SUPPLY CO., 1610 S. Michigan Avenue

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1000 Pound Capacity

Sheridan Commercial Car

Ready for Delivery Now

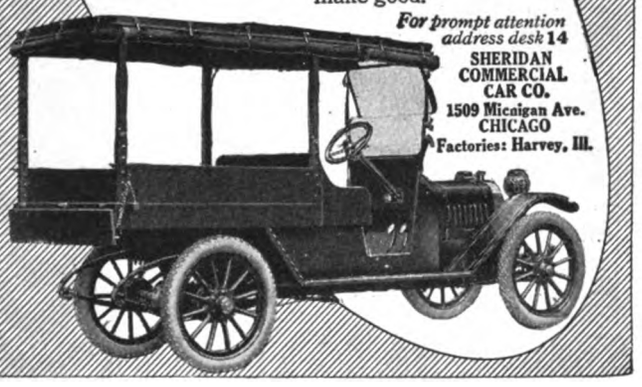
Fully Equipped Price $540

THE SHERIDAN is the lowest priced delivery car on the market. Thoroughly equipped and properly built to do the work it's designed for—haul 1000 pounds any time—anywhere. Ample in size, load capacity and power.

Sells fast to a big, ready-made field of *buyers*. Not a rebuilt pleasure car. Made a truck through and through by manufacturers of trucks, to replace horses where price is what counts. Chassis alone, **$490.** Fully equipped, **$540.** Write or wire for complete details. Make territorial reservations now. Dealers make good.

For prompt attention address desk **14**

SHERIDAN COMMERCIAL CAR CO.
1509 Michigan Ave. CHICAGO
Factories: Harvey, Ill.



Handle Your Time Sales on the

Guaranty Time Payment Plan



Guaranty Securities Corporation

Equitable Building, New York City

San Francisco
Hobart Building

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National Trust Company

THE MARK OF A BETTER RADIATOR

G & O Radiators for Heavy Duty Service

The G & O Mfg. Co.
New Haven Connecticut

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AUTOCARS
are equipped with the
"JASCO" TANK

Why? Because demonstrated service facts have proven that this gasoline receptacle makes fuel absolutely safe from fire or explosion and devotes every drop to energy.



"JASCO" TANKS are made of drawn steel. They are seamless, tinned and tested and positively cannot spring a leak even under the most severe conditions. They are money savers, life and property protectors. If your car is equipped with an old fashioned riveted tank you are courting danger. Investigate the "JASCO" today. Full details on request.

The "Jasco" Tank is used and indorsed by the following prominent manufacturers:

PLEASURE CARS

Biddle Motor Car Company, Simplex Automobile Company, Mercer Automobile Company, Lozier Motor Company, Stanley Motor Cariage Company, James Cunningham Son & Company, H. H. Franklin Mfg. Company.

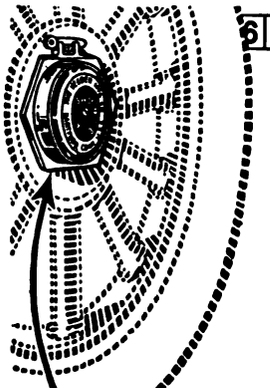
TRUCKS

Baldwin Locomotive Works, Autocar Company, General Vehicle Company, H. G. Burford Company, Peerless Motor Car Company, Garford Motor Truck Company, Gramm Motor Truck Company, Thomas Auto Truck Company, Motor Trucks, Ltd., Canada.

JANNEY, STEINMETZ & CO.

Main Office: PHILADELPHIA

New York Office: HUDSON TERMINAL BUILDING



Upkeep

Does Jones run his truck for 5c a mile while it costs you 7c? Keep cost records for your tires, gasoline, repairs, oil, etc., and find out why. Get your costs from your bills and your exact mileage from a

Veeder Hub Odometer

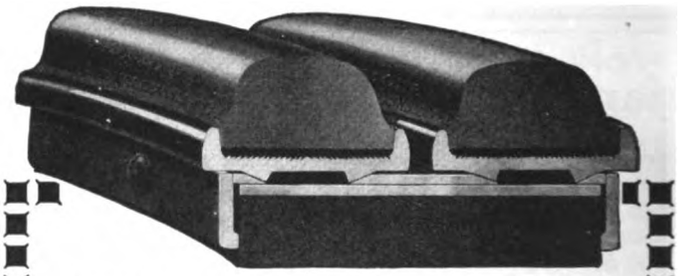
You will then know the cause and remedy it. A saving of 2c per mile pays for your Veeder Hub Odometer in 1000 miles. Equip your truck or pleasure car with a Veeder now and know accurate facts about your mileage.

Price complete $20. Special model for Ford Cars, $15.

Cyclometers for Bicycles and Motorcycles. Odometers for Automobiles and Horse Drawn Vehicles. Counters for practically every purpose. Tachometers, Tachodometers and Fine Die Castings.

Veeder Mfg. Co.

54 Sargeant Street **Hartford, Conn.**



The Working Test

—the only fair way to find the real value in Firestone Truck Tire equipment is to give it the test of service.

Efficiency trials will soon show the mileage, dependability and resiliency of

Firestone

Economy and the good of the service will then demand Firestone for every road, load and condition of service. Our transportation engineers, located at all branches, are at your service.

Firestone Tire and Rubber Co.

"America's Largest Exclusive Tire and Rim Makers"

Akron, O.—Branches and Dealers Everywhere

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WICHITA TRUCKS

Dependability Plus Service

We want a Dealer with energy and spirit,—we want one who will make the co-operation with him of our factory organization worth our while, and his. We want men who can interest concerns in our heavy-duty trucks and then not let up until they sell them.

If you are such a Dealer we have an interesting selling proposition that will interest you immensely.

Besides the WICHITA 3½-ton capacity truck, we have a 2½-ton and a 5-ton truck—both worm driven.

Write us for our plans.

WICHITA FALLS MOTOR COMPANY

Arthur Boulevard, Wichita Falls, Texas

NEVER-LEAK

Copper Asbestos-Filled

GASKETS

Get your estimate on your next gasket requirements. You will be agreeably surprised.

For producing absolutely gas-tight joints nothing has ever been invented to compare with Never-Leak Gaskets. You can protect yourself from all worries over compression leaks if you fully equip your motor with these Copper Asbestos-Filled Gaskets.

The copper gives malleable metal contact surfaces. The asbestos secures a body which retains a powerful spring under compression.

If you have gasket trouble of any nature consult our Engineering Force. This will involve you in no obligation or expense.

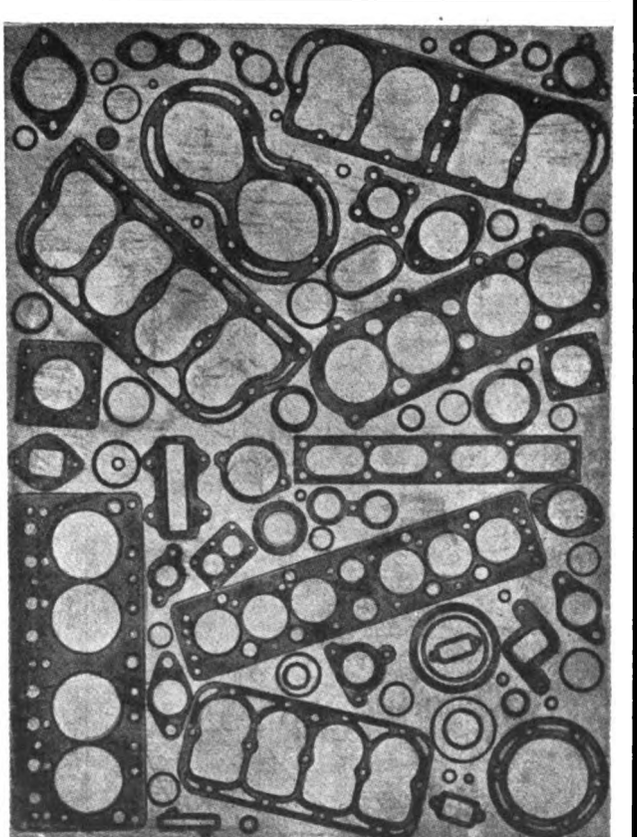
Write for our estimates. We are equipped with many thousand special dies such as here shown and can readily produce the gaskets you need.

Have "Never-Leak" on every gasket.

The Fitzgerald Mfg. Co.

TORRINGTON, CONN.

Gasket Dept.



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MONARCH

LIMITS THE SPEED AND THE EXPENSE



KEEP YOUR 'HAND ON THE THROTTLE

Truck speeding is the commonest form of abuse and always results in disaster. Because a truck is big and strong and heavy, drivers ignore the excessive strain created by speeding.

It would be ideal if you could keep your hand on the throttle—for it would mean greater economy, better and more dependable service, longer life and safety. The Monarch Governor is built to do just that—it limits the speed without limiting the power.

It's the only Governor designed solely for internal combustion engines, and the only one which cannot be tampered with by the driver and continued in service without the owner's knowledge. Tampering with it disables the engine.

Write today and arrange for 30-day test. Our catalog describes the Monarch—its construction and operation.

Monarch Governor Company
Detroit, Michigan U. S. A.

Sterling TRUCKS

THIS complete line of worm gear driven trucks affords the dealer an unusually profitable opportunity. Write for open territory.

STERLING MOTOR TRUCK CO.
838 Rogers Street Milwaukee, Wis.





"M & E"

Special Finish GREASE CUPS



Our new Ratchet Top Grease Cup is the best constructed cup on the market. Pleasing in design, larger grease capacity, better threads and a longer and stronger shank. The chief feature of the new cup is our "Special Finish" which

Resists Rust

to a far greater degree than plain or rough steel. This finish should retain its original polish and lustre with only an occasional rubbing with an oily rag. No coating to peel.

No Advance in Price

Sample and prices on request
Send us your requirements

"EVANS" UNIVERSAL JOINTS — "HELE-SHAW" CLUTCHES

MERCHANT & EVANS CO.
Philadelphia

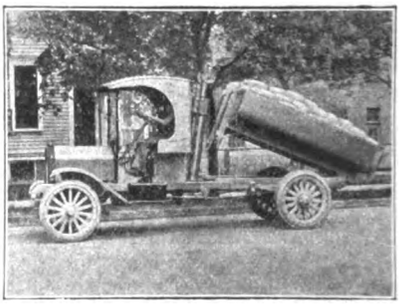
New York
Baltimore
Atlanta
Cleveland

M & E

Wheeling
Chicago
St. Louis
Kansas City

Stegeman

SIX-CYLINDER
SELF-STARTER
WORM-DRIVE
TRUCKS



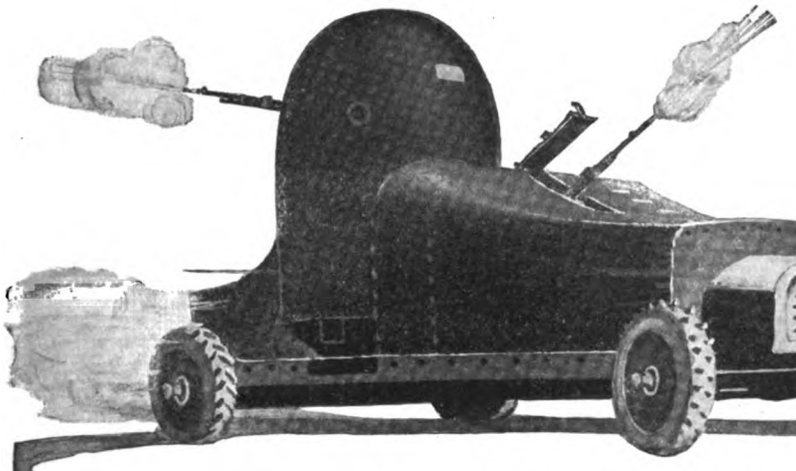
The most for your money—that's what we offer. A 6-cylinder Motor, Electric-Starter and Electric-Lights are furnished on our truck without extra charge. On any other machine they would cost $300 extra.

Ours is not the cheapest truck on the market, but it is certainly a low-priced line, quality considered.

WE WANT RELIABLE AGENTS

STEGEMAN MOTOR CAR CO.
Milwaukee, Wisconsin

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The Best Way to Protect Your Motor!

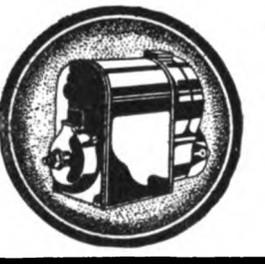
To protect it from ignition troubles of any kind, install an

EISEMANN MAGNETO

You'll be sure of full power from every explosion; the intensely hot spark —*even at very low speed*—takes care of that!

You'll have ignition you can depend upon—easy starting—sure fire of any mixture, richest to leanest—that's the Eisemann Reputation.

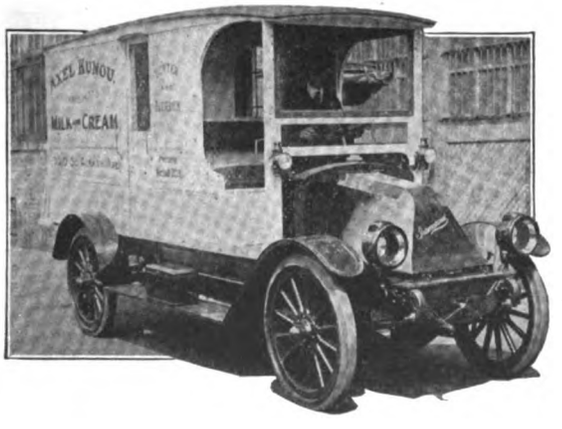
THE EISEMANN MAGNETO CO.
Sales and General Offices, 32-33d Sts., Brooklyn, N. Y.
Detroit, Mich., 802 Woodward Ave.



International Motor Trucks — Profit-Builders

THESE are the trucks of which there are more at work than of any other line of motor trucks made—a remarkable record. This year the factory and output are to be more than doubled to meet the fast-growing demand.

International trucks are popular because for years they have been saving and making money for men who have material and supplies to transport. They will handle **your** hauling rapidly and economically, in the right size and style of tried-out motor trucks, giving day-in day-out service, making the best impression through both appearance and reliable performance—**there** is better 1917 business for you! Then consider these



New Low-Price Internationals

Model H—1500 lbs. capacity, internal gear drive (chassis) $1225
Model F—2000 lbs. capacity, internal gear drive (chassis) 1500

Prices cash f.o.b. factory.

Eighty-nine company branches and thousands of local distributors cater to the needs of *International* owners. Up-to-the-minute service is always at your hand. Write to the address below for attractive folders with all the details and full information. You owe it to the prosperity of your future to know more about the *International* Motor Trucks. *Now* is the best time to write.

International Harvester Company of America
(INCORPORATED)
88 Harvester Building **Chicago U S A**

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One Thousand Miles on High Gear

OVERLOADED 20 PER CENT.

Every hill on this route through Ohio and Michigan was taken on high without straining. Read the story in our booklet "The Wizard of Trucking." Only a Six and only a "Globe" could do it on 12½ miles per gallon of gas.



Six Cylinder Motor

trucks handle like a pleasure car. Start easier. On high 1½ miles to 25 miles per hour. 11 to 15 miles per gallon of gas. Quieter operation. Minimum motor vibration. Go anywhere, any roads, any time. Agencies being established rapidly. Write today.

MFG. BY

THE GLOBE MOTOR TRUCK CO.

NORTHVILLE, MICH.

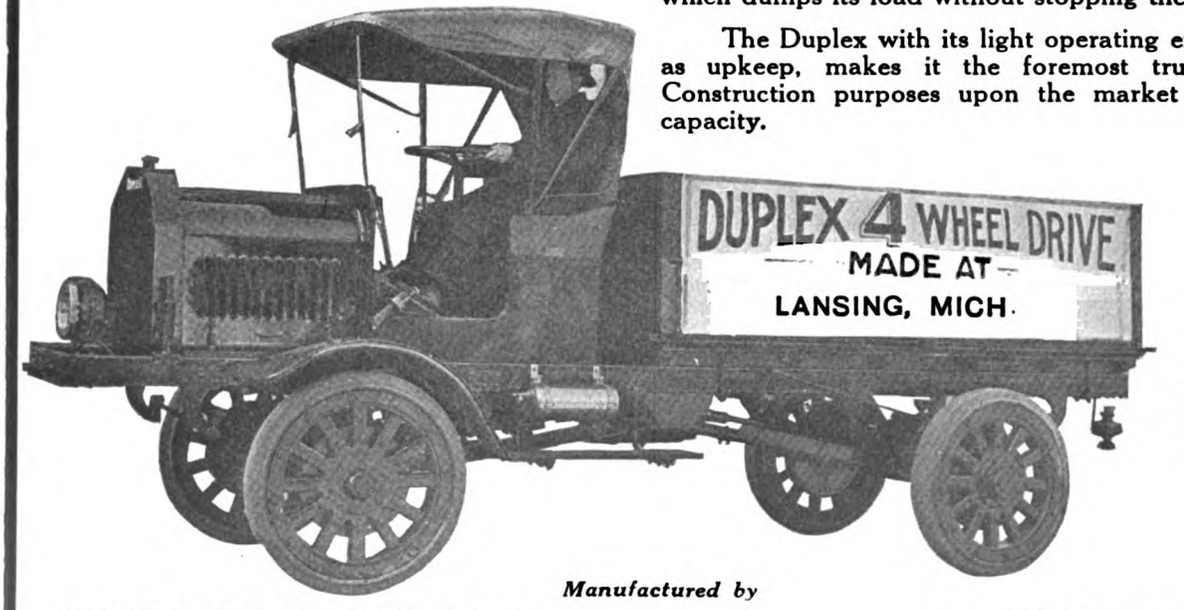
DUPLEX 4 WHEEL DRIVE

THE TRUCK OF EARNING EFFICIENCY

This cut represents the Duplex 4-Wheel Drive Road Truck, and is one of many others hauling one hundred and fourteen yards of gravel every twenty-four hours, a distance of 7.7 miles and at $1.00 per yard, earns $114.00 per day.

This truck with trailer has Duplex Side Dump Body which dumps its load without stopping the truck.

The Duplex with its light operating expense as well as upkeep, makes it the foremost truck for Road Construction purposes upon the market regardless of capacity.



Made in two- and three-ton capacity

Manufactured by

DUPLEX TRUCK CO., Lansing, Mich.

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Quality Construction plus Quality Performance equals "*On the Job*"

The claim of the Signal Motor Truck for your business is not based upon any sensational exploit or any sensational feature. It is based upon two things only: (a) quality construction all through, (b) quality performance in daily service.

The quality construction is evidenced by the use of exclusively quality units, such as Continental Motors, Timken-David Brown Worm Drive Rear Axles, Ross Steering Gear, Brown-Lipe Transmission, Eisemann Magneto, Detroit Self-Lubricating Springs, Stromberg Carburetor.

Equally important with the quality of the units is the careful engineering and the practical skill with which the various units are harmonized into one complete unit of remarkable strength, endurance and reliability, so that the uniform experience of users everywhere is quality performance in daily service—and the uniform report to those who inquire of users concerning Signal Motor Trucks may be boiled down into five words: "They are on the job."

No matter what business you are in, no matter for what service you require a motor truck, the most important element you can buy in a truck is the ability to be "on the job."

Signal Motor Trucks are built in all sizes, from 1 ton to 5 tons. Write for catalogue and full information concerning the Signal line.

Signal Motor Truck Co.

Detroit, Mich.



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Smith Form-a-Truck

$350

f. o. b. Chicago

Many Progressive Dealers

THE Smith Form-a-Truck dealership has meant a small fortune during the past year to each of a large number of aggressive automobile men in all parts of the country.

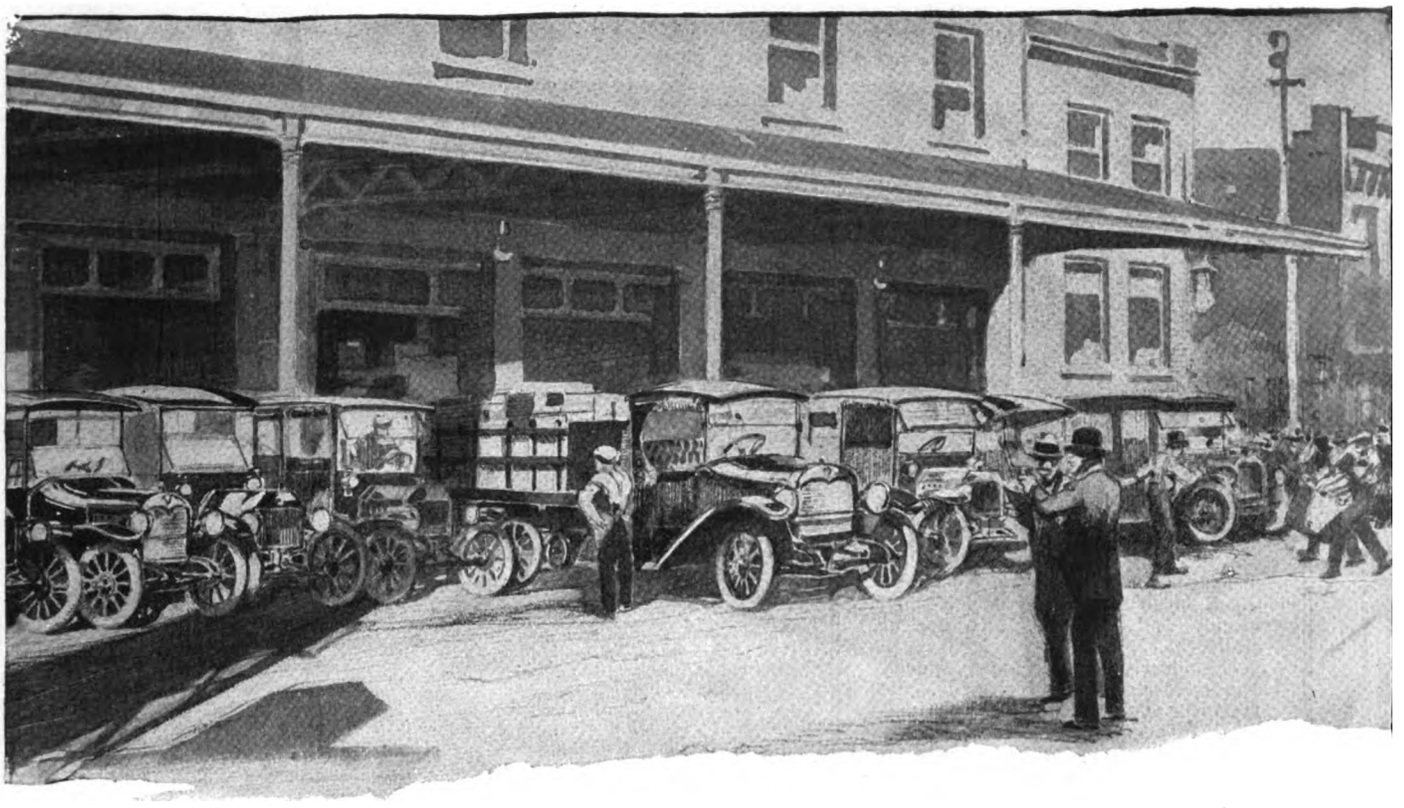
Smith Form-a-Trucks have sold in larger quantities than any other motor truck, or all other motor truck attachments. Over 9,000 are now in use and thousands more are on order for immediate delivery.

The support rendered to every Smith Form-a-Truck dealer in the way of advertising — direct sales helps—real merchandising effort—has been greater than ever before rendered by either motor truck, motor truck attachment or pleasure car manufacturer.

Even greater co-operation will be extended during the coming year. Tremendous developments in construction have now resulted in Smith Form-a-Truck attachments for Dodge, Chevrolet, Buick, Overland and Maxwell cars at the same price as the original attachment for the Ford.

There are still a limited number of Smith Form-a-Truck sales territories open. These are rapidly being closed. Only dealers qualified by real sales achievements are being considered.

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Have Made Small Fortunes

The Smith Form-a-Truck dealership is your opportunity—if your territory is still open—and you are qualified.

Make your application now—by wire—it is the only way to get in touch with the biggest chance to make real money that has probably ever come your way.

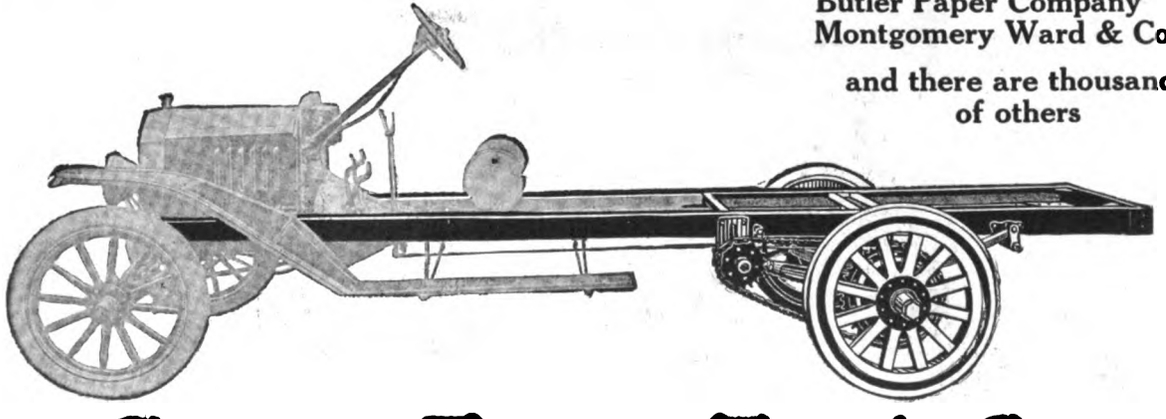
Tie up with a real campaign of dealer helps—with the biggest, strongest attachment manufacturer in the country—with the most successful motor transportation sales sensation of the industry.

See it at the Show. Smith Form-a-Truck will be on exhibit at the big Automobile Shows. See it—make arrangements for territory.

These big concerns operate Smith Form-a-Trucks

Standard Oil Company
Armour & Company
Morris & Company
Indian Refining Company
Fleishmann Yeast Company
Cudahy Packing Company
U. S. Mail Contractors
Schlitz Brewing Company
Butler Paper Company
Montgomery Ward & Co.

and there are thousands of others



Smith Form-a-Truck Co.

1470 Michigan Boulevard, Chicago

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Haul It in a Hall

For Safety and Saving

There is nothing fine-drawn or delicate about the HALL TRUCK.

Here is a picture of one carrying four tons of steel. The rated capacity of this particular truck is three and a half tons, but just the same you can hop in, put your foot on the gas and drive this load away with absolute ease and safety.

And you can speed up, turn corners, plough through mud or sand, roll over rough roads—absolute ease and safety just the same!

That is the big point about the Hall—its in-built over-strength—its ability to rise to an occasion, to fill in an emergency, when time, money and business faith are at stake.

Big, burly, strong and speedy above all prospective needs, the Hall is an extraordinary time-saver, a cost-reducer, and the perfect embodiment of dependability.

In addition to its other merits the HALL is equipped with an IMPROVED WOOD HYDRAULIC HOIST, the fastest, most efficient and economical dumping device known, and a great cost cutter.

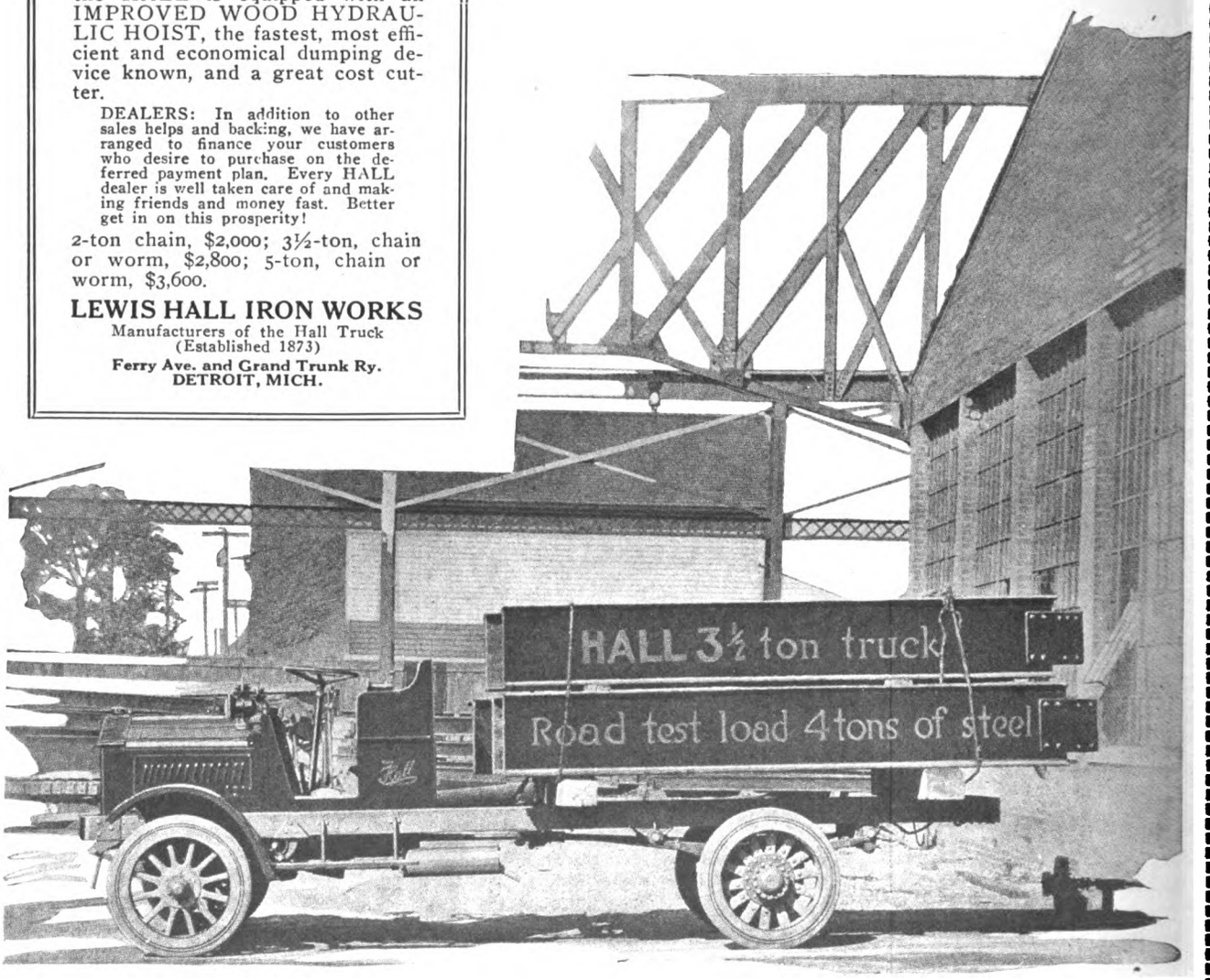
DEALERS: In addition to other sales helps and backing, we have arranged to finance your customers who desire to purchase on the deferred payment plan. Every HALL dealer is well taken care of and making friends and money fast. Better get in on this prosperity!

2-ton chain, $2,000; 3½-ton, chain or worm, $2,800; 5-ton, chain or worm, $3,600.

LEWIS HALL IRON WORKS

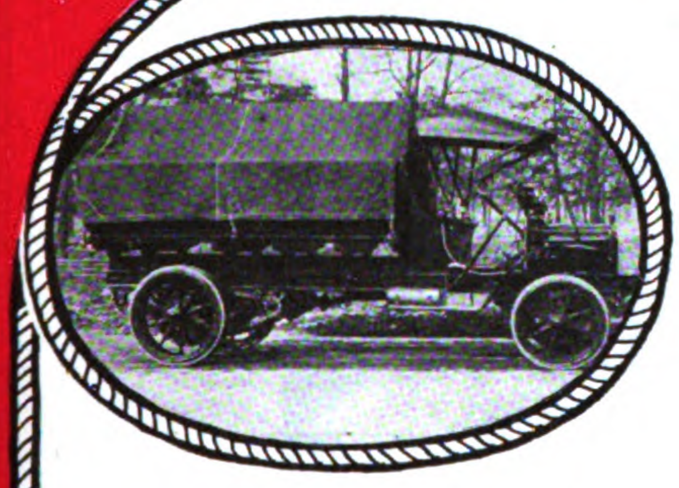
Manufacturers of the Hall Truck
(Established 1873)
Ferry Ave. and Grand Trunk Ry.
DETROIT, MICH.

THE Hall TRUCK

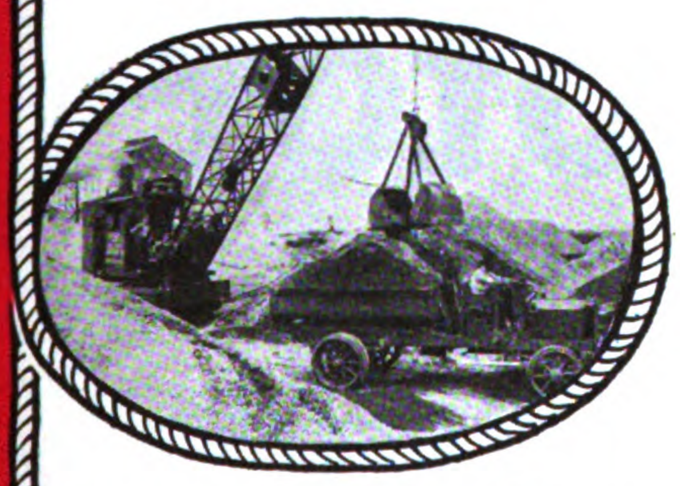


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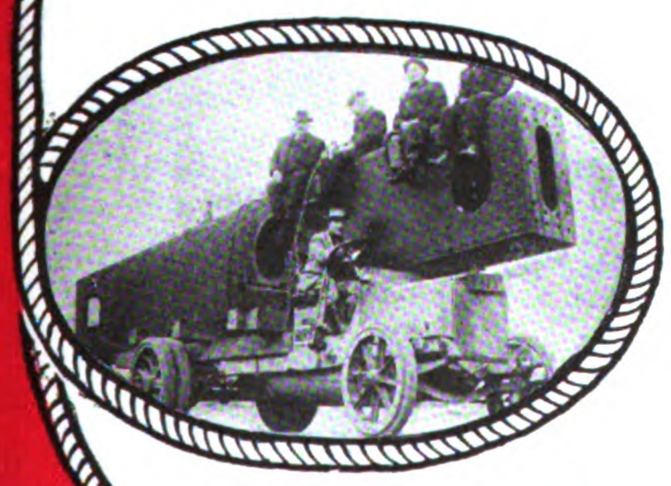
WEST'S CAST STEEL WHEELS ARE NOW IN USE BY 23



Here are some of the . . .



best known makes of trucks . . .



employed on heavy duty . . .

—of the most prominent Truck and Trailer Manufacturers in the United States.

They are real Bessemer steel —not iron—wheels. And don't forget that this makes a big difference.

They are the lightest and strongest wheels made.

They are practically indestructible and could be broken only by an impact sufficient to wreck the truck itself.

Hubs are cast integral with the wheel and they are designed for use with either pressed on or demountable type of tires.

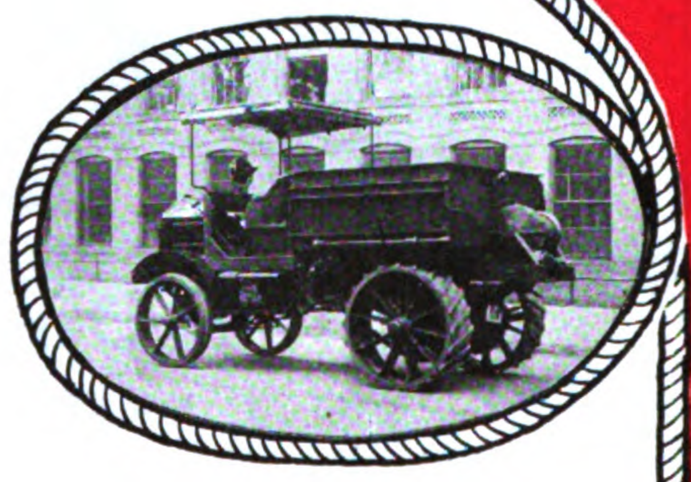
None—so far as we know—has ever failed. And over 25,000 of them are now in use.

We guarantee them absolutely.

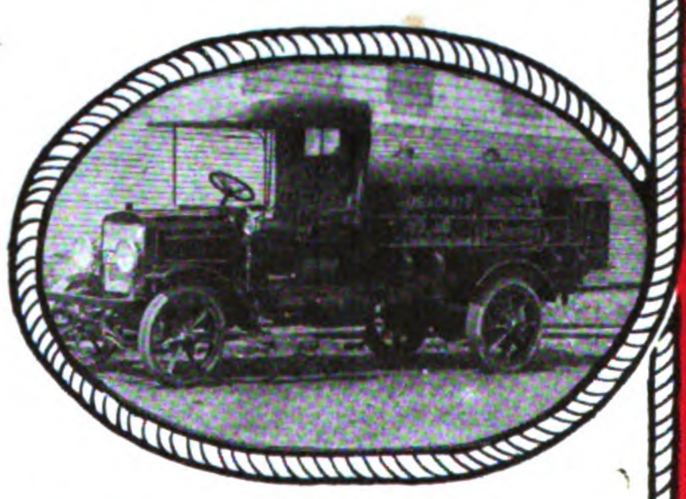
THE WEST STEEL CASTING COMPANY
805-815 E. 70th Street,
CLEVELAND, OHIO

"Watch the West Cast Steel Wheels go round."

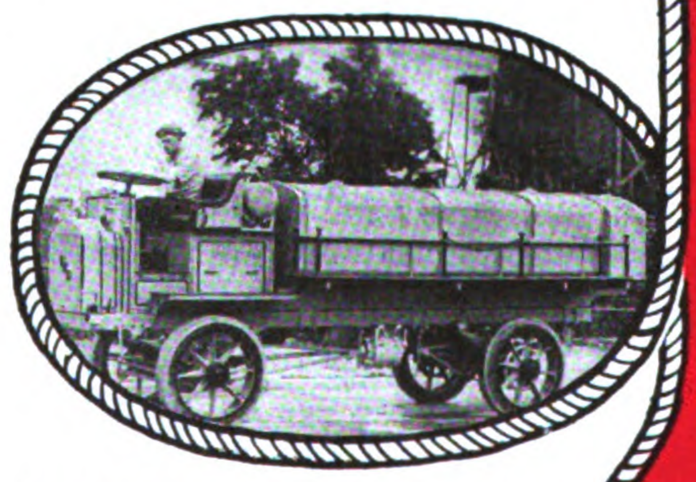
Get in this Line



work of different kinds . . .



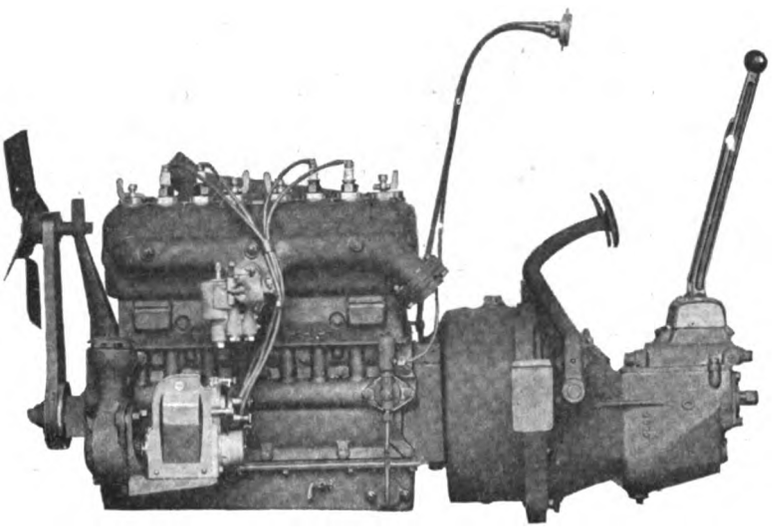
and all of them using . . .



West's Cast Steel Wheels.

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The 1917 Model—Ready Now



One Model—One Size

Four Cylinders 3¾ x 4¼ in. 22½ H. P. (A. L. A. M.)
36.9 H. P. at 2800 r. p. m. Three bearings.

G·B&S motor

This is the same G. B. & S. motor on which we have concentrated for several years, but it has been refined, and refined again, until we verily believe it is as nearly perfect as it is possible to build any motor.

Refinements for 1917 include four definite improvements.

Shorter intake—permitting placing of carburetor closer to motor, thereby reducing gas friction and increasing motor efficiency.

New chain adjustment which permits taking up all slack and keeping the motor noiseless. Chains may be adjusted quickly while motor is running. Send for details of this feature.

Now using ½" pitch chain with master connecting pin instead of ⅜" as heretofore.

Larger flywheel which gives greater starting torque and makes the G. B. & S. motor singularly free from vibration.

Larger flywheel housing provides ample room for placing of an "in-board" starter, adapted to any standard electric starter.

These are all refinements of detail. We could not improve the G. B. & S. "Four" from the standpoints of power, quality, economy, long life, flexibility and service. But by concentrating on this one size and one type of motor we have brought it to an unusual pitch of excellence.

If you are interested in a dependable, reliable, smooth-running "four" write

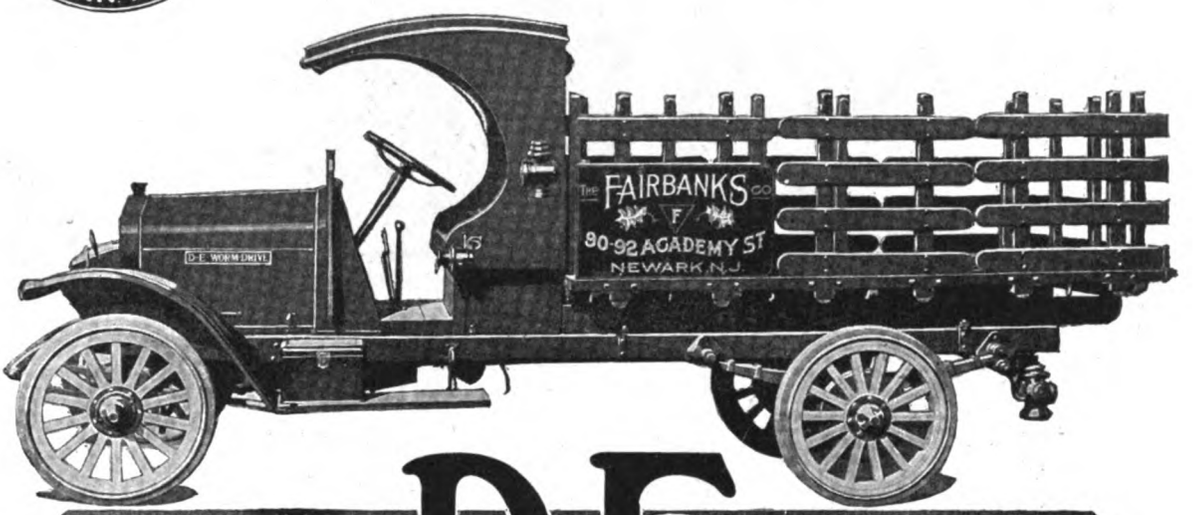
Golden, Belknap & Swartz Co.

Detroit, Mich.

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DAY-ELDER MOTORS CO
D
WORM-DRIVE
E
NEWARK, N.J. U.S.A.

1-ton Worm-Drive chassis, $1500. Solid tires, regular equipment. Pneumatic or cushion tires optional at slight additional cost.



DE

WORM DRIVE MOTOR TRUCKS

3/4 Ton $975 .. 1 Ton $1500 .. 1½ Ton $1800

Built and Sold for Everlasting Service.

When motor trucks can be made better—we will make them better.

Send for catalogues

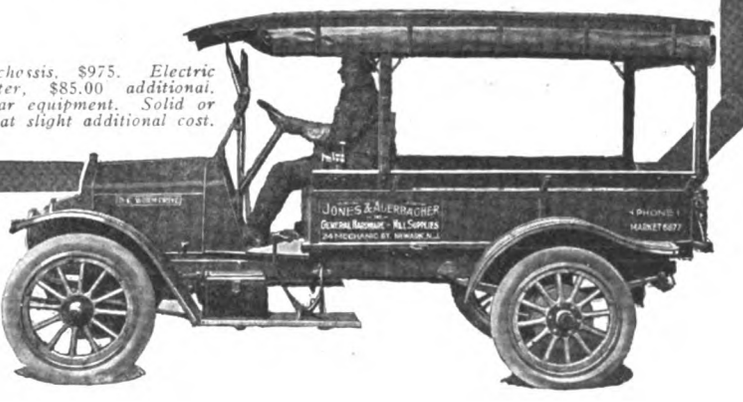
WE want to make an Agency connection in Boston. We want to correspond with a firm or individual there who believes in worm-drive as the best form of final drive in motor trucks—and who believes that he can sell enough worm-drive light delivery motor trucks, made of Continental and LeRoi motors, Sheldon worm-drive rear axles and Sheldon front axles and springs, Parish frames, Gemmer steering gears, Detroit transmissions, Jones wheels, Stewart-Warner vacuum systems, speedometers and horns, and so on (only the very best and most expensive units) to make good money for himself, and us. Also who believes that his interest in a motor truck purchaser should not cease upon the sale to him of his truck, but should only begin then—or in other words that *SERVICE* to owners is as important as *sales* to prospective purchasers.

WANTED!

To such a man in Boston, we have a very attractive proposition.

We also have an equally attractive proposition for someone who can subscribe to this platform in Hartford, New Haven, Albany, Syracuse, Cincinnati, Indianapolis. Also some other large cities and a number of smaller cities and towns. *Telephone, Telegraph or write for further information.*

¾-ton Worm-Drive chassis, $975. Electric lights and Self-Starter, $85.00 additional. Pneumatic tires, regular equipment. Solid or cushion tires optional at slight additional cost.



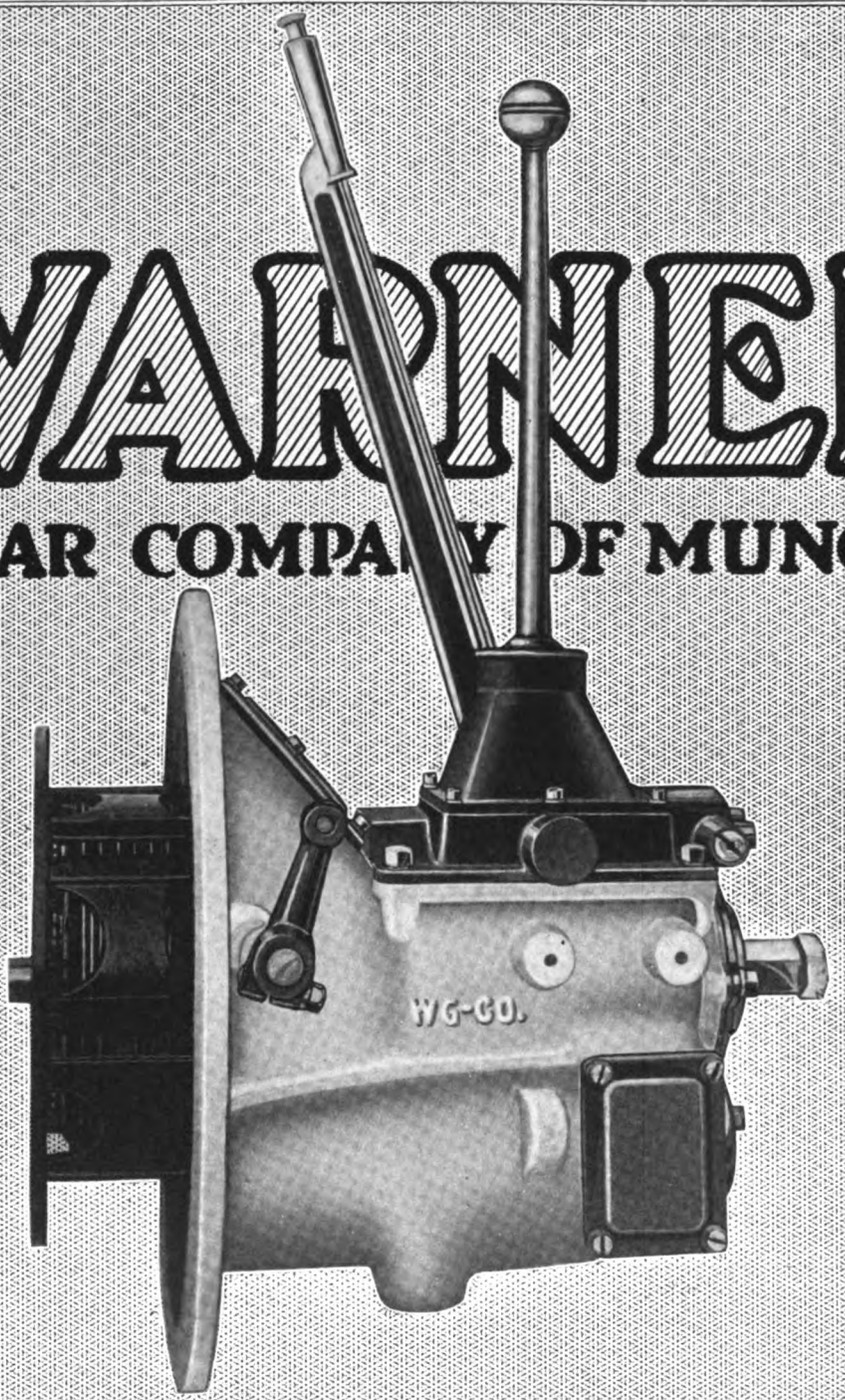
Day-Elder Motors Co.

Newark :: New Jersey

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WARNER

GEAR COMPANY OF MUNCIE



Warner Truck Transmissions

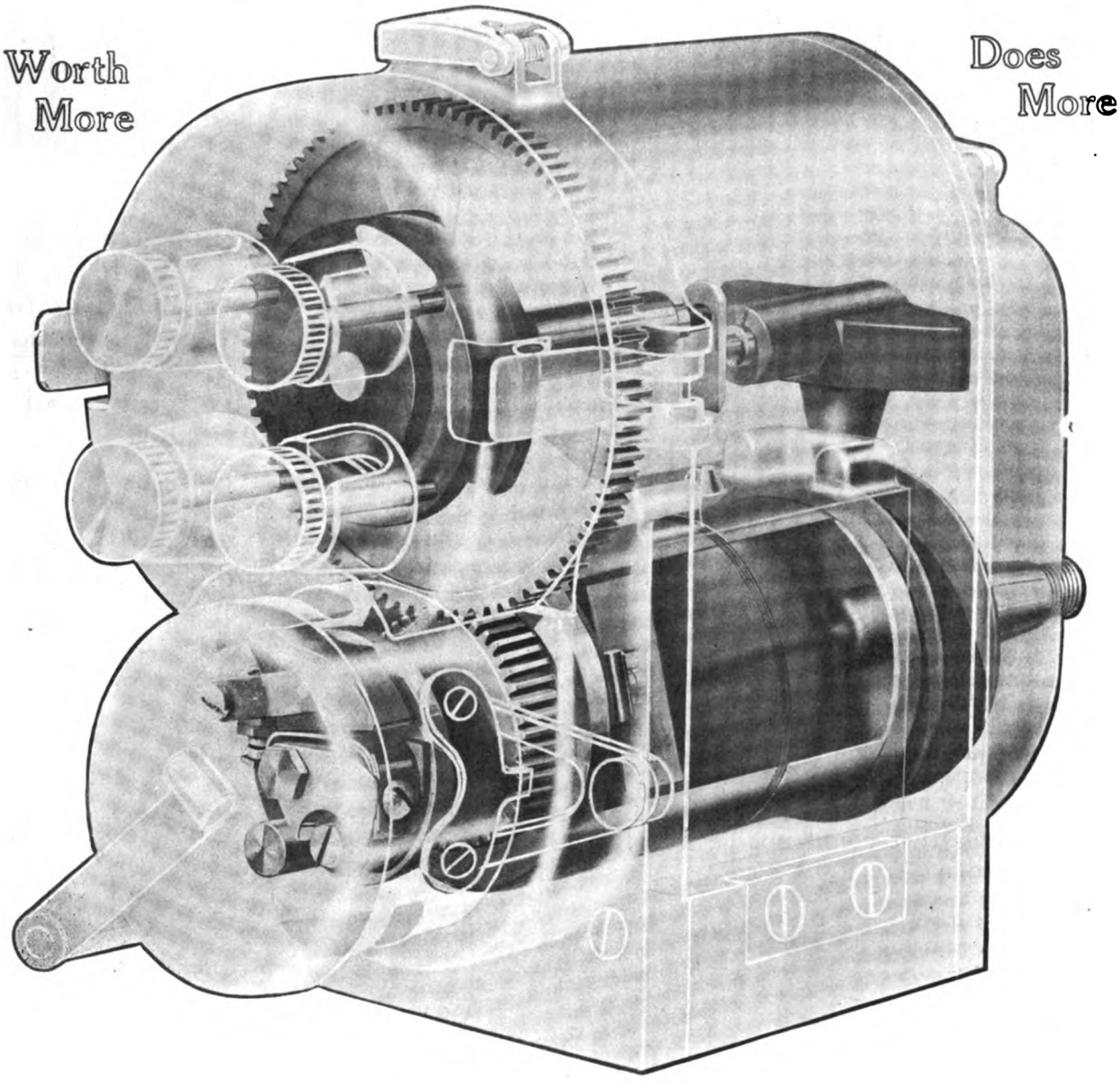
A Mark of High Quality and Long Service In Any Motor Truck

TRANSMISSIONS · CLUTCHES STEERING GEARS · DIFFERENTIALS

WARNER GEAR COMPANY, Muncie, Indiana

Detroit Office, 967 Woodward Ave.

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Berling Magneto

Why This Is 1917's Greatest Magneto

This new E-41 Berling Magneto (illustrated above) combines all the features which have made the Berling "worth more." And yet, manufacturers who consider price, may well investigate this—for production increases have enabled us to offer this new Berling at an interesting figure.

Enclosed and waterproof—parts easily adjustable and removable without use of tools. Self-cleaning distributor finger—danger of carbon is at minimum. Interrupter is same as used on other Berlings, which have given this magneto full right to the claim, "Holder of the world's most remarkable record."

This type can be had in either independent or dual type. Deliveries can be made immediately.

See this in space C-102—at New York Automobile Show.

Ericsson Manufacturing Co., 1180 Military Road, Buffalo, N. Y.

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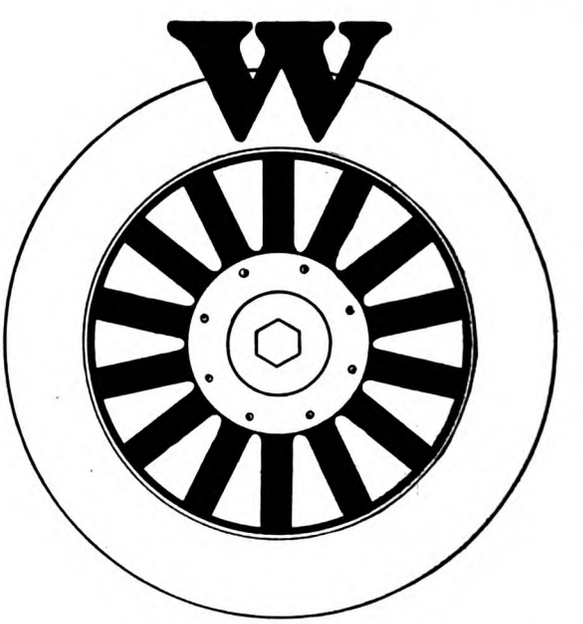
Dependability

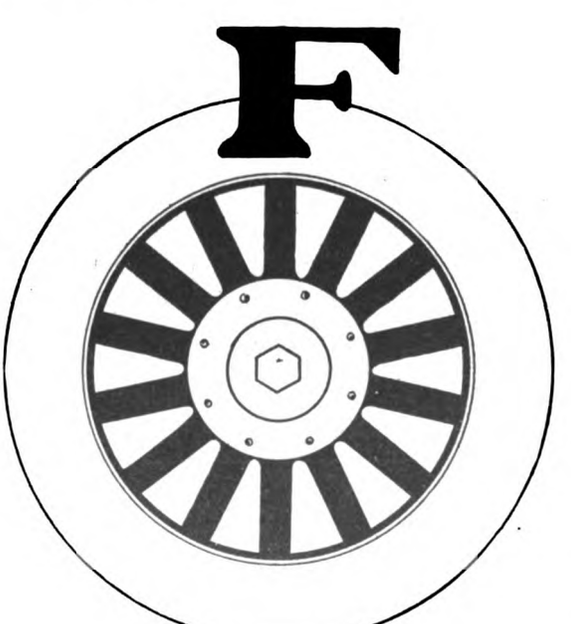
F W D

DEPENDABILITY in a truck begins with the company that builds it. Then the mechanical design, the materials and the thoroughness and care in building. All these factors manifest themselves in the performance, durability, economy and efficiency of the truck in service.

Dependability in the F-W-D Truck began when the first one was built over six years ago. That the original design could be depended upon has been proved by the absence of any radical changes made since then—the increasing demand and growing reputation and the fact that the first F-W-D Truck is still in service. The principle of the Four-Wheel-Drive as applied in this truck adds a large factor of dependability that cannot be built into a truck whose power is concentrated in the rear axle.

The even distribution of power means traction in four wheels—therefore less waste power, less wear on tires, less vibration. It means ability to go over roads and obstructions that could not be negotiated by a rear drive truck.



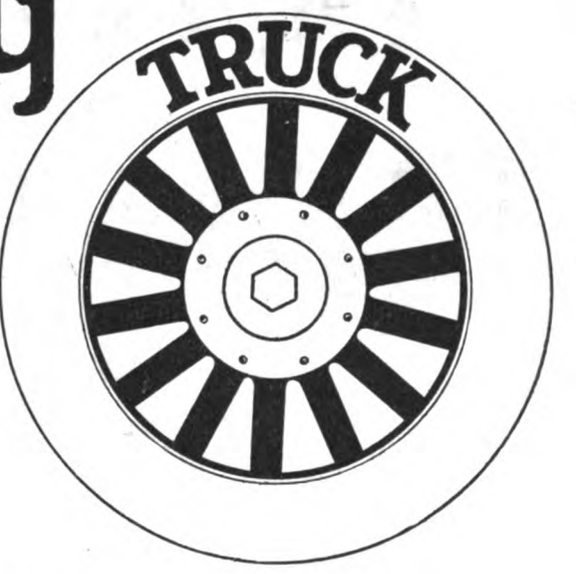


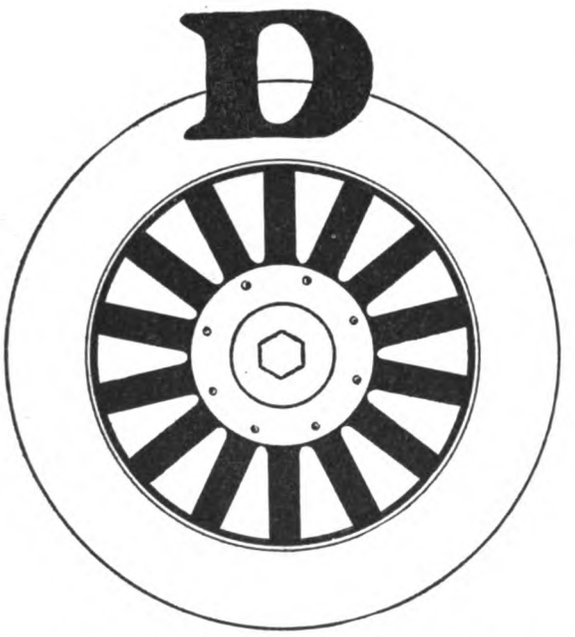
It means a balanced load, 45 per cent on the front axle and 55 per cent on the rear axle. On other types of trucks 75 to 90 per cent of the load and all of the power is in the rear axle.

The high efficiency attained by F-W-D Trucks is the direct result of over eight years concentrated effort on the development of the four wheel drive principle in a truck of reliability under all conditions.

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Economy





POWER in four wheels means power efficiently applied—it means more actual driving power with the same energy supplied by the motor—more useful power per gallon of gasoline.

Equal distribution of power and weight means great saving of tires.

The lifting power of the front wheels in the F-W-D Truck takes much of the burden off the rear wheels and prevents shocks to tires, frame and mechanism. The power being in all four wheels and the brakes acting on all four wheels makes the traction so uniform that skidding is practically eliminated—a further saving of tires.

DEALERS

Every argument of reliability, power, performance or economy put forward for the rear wheel drive trucks can be made with still greater claims and these claims can be demonstrated. Our market is to business men who want a truck that will be a good investment, that will pay dividends, in extra life—extra efficiency—extra economy. To demonstrate the F-W-D to men of this type is to sell it.

Dealers of standing who are seeking a permanent connection on a sound business basis are being added in unoccupied territories. To such dealers, or to responsible men who desire to enter the truck business we will gladly send our dealer's agreement, prices, discounts, etc.

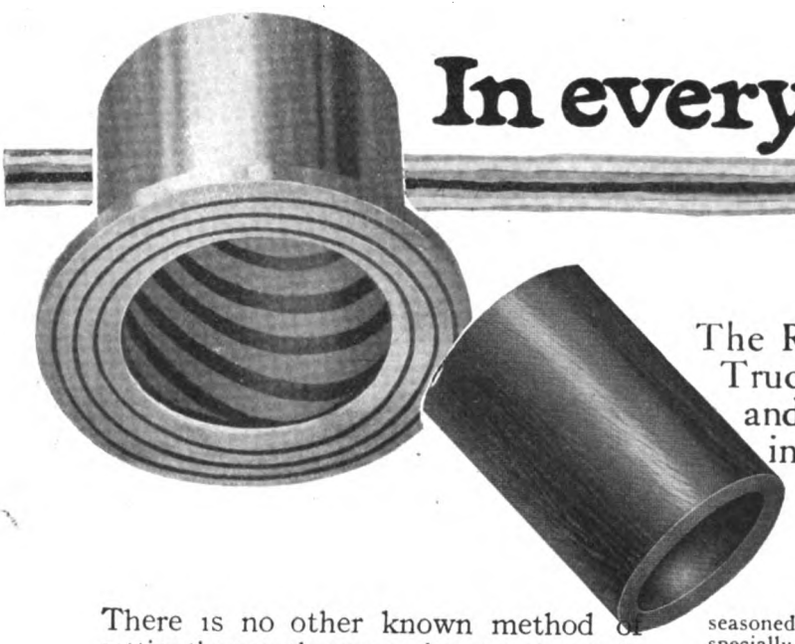
Four Wheel Drive Auto Co.

Dept. K **Clintonville, Wisconsin**



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In every Riker Truck



The Riker (Locomobile Co.) Truck uses "Bound Brook" and "Nigrum" Oil-less Bearings and Bushings because—

There is no other known method of getting the smooth-running, long-wearing qualities that these Oil-less Bearings and Bushings give to truck or pleasure car.

"BOUND BROOK" (*Graphite-and-Bronze*) Oil-less Bushings are made of the finest bearing bronze, so designed and constructed as to retain lubricating graphite. They are "oiled for life" when made and, once installed, need no attention whatever.

Trucks equipped with them deliver better service with less attention and remain longer out of the repair shop. This fact is recognized by the Locomobile Company of America, as well as by nearly all manufacturers of quality-built cars and trucks made in this country

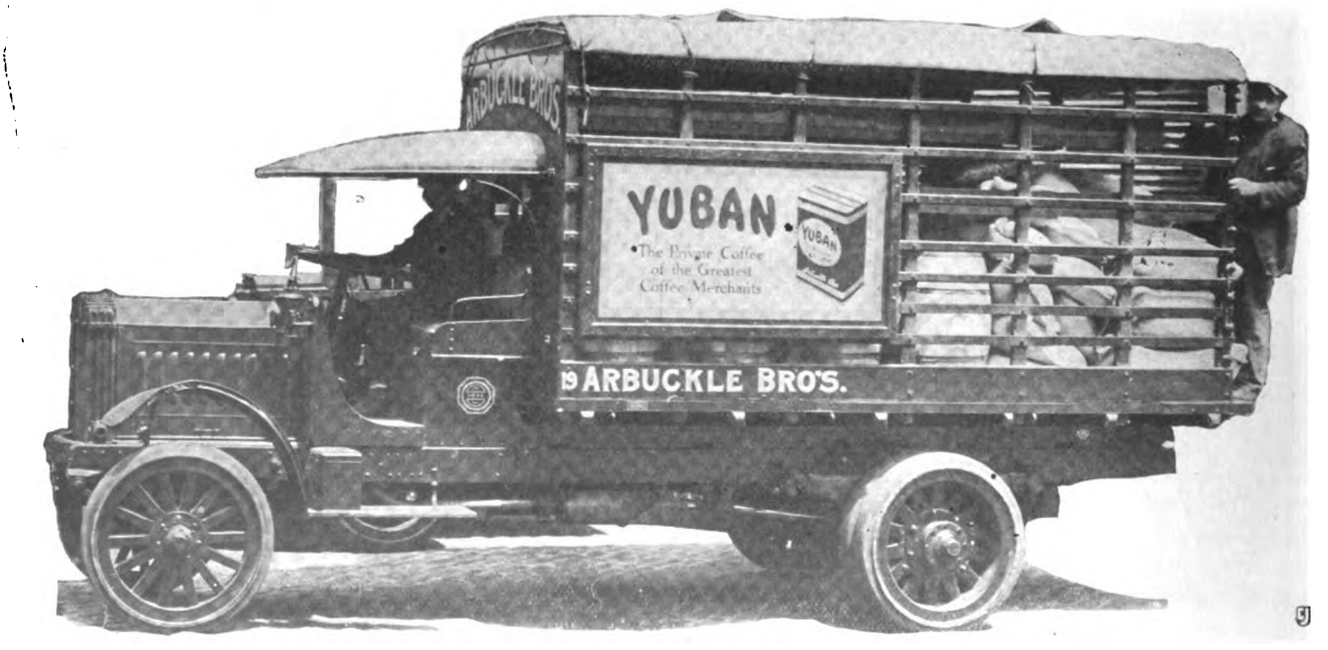
"NIGRUM" (*Impregnated Wood*) Oil-less Bearings are made of hard wood, carefully seasoned and then thoroughly impregnated with our specially prepared lubricating compound. They possess all the good points of the "BOUND BROOK" Bearings, with the additional advantage of being light in weight

Correctly placed, "NIGRUM" Bearings will run more quietly, more smoothly for a far greater length of time and at less cost than any ordinary bearing or bushing can hope to equal This is a fact that has been amply demonstrated by many years of actual service in machinery of all kinds.

We should be glad to co-operate with any manufacturer in assisting him to solve his bearing problems. We have specialized in the manufacture of Oil-less Bushings for more than a third of a century.

All genuine graphited Oil-less Bearings have always been made at Bound Brook, U S A

BOUND BROOK OIL-LESS BEARING COMPANY
BOUND BROOK NEW JERSEY



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Six Pierce-Arrow Trucks Move 102,550 Tons in 200 Days

Six 5-ton Pierce-Arrow Motor Trucks owned and operated by E. C. Humphrey, contractor of Hackensack, N. J. recently completed a big road building job on which they hauled 102,550 tons of material over distances ranging from 1,000 feet to 15 miles in 200 working days.

As in many contracting jobs, time was the essence of the contract. Frequently the trucks, working 24 hours a day, covered over 200 miles. A big asphalt making plant was located near Mr. Humphrey's Hackensack dock, and here all supplies were received with facilities for prompt and economical loading into the trucks.

During the 200 working days the following materials were received at the docks and loaded into the trucks:

100 scows of sand and stone, averaging 900 tons each
4 loads of lime dust, averaging 400 tons each
9 boatloads of asphalt, averaging 400 tons each
6 boatloads of paving block, averaging 900 tons each
3 boatloads of coal, averaging 350 tons each
2 boatloads of paving block, averaging 450 tons eaeh

Mr. Humphrey gives much of the credit for his success on big contracting jobs in many parts of the country to his Pierce-Arrow trucks, and says that he believes the Pierce-Arrow by long odds the best motor truck made.

A number of other interesting installations are shown in our booklet, "What Pierce-Arrow Motor Trucks are doing in the Contracting Business." We shall be glad to send you a copy.

THE PIERCE-ARROW MOTOR CAR COMPANY
BUFFALO, N. Y.



PIERCE
PIONEER WORM DRIVE

The Worm-Gear

All Pierce-Arrow Trucks are equipped with the worm-gear drive, which is a positive guarantee of effective service under the most difficult conditions.

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—for both prove their worth through their ability to resist wear in the grind of steady service. But shoes may wear out without actual danger. Quality in Brake Lining is absolutely vital.

GARCO is built to back your good workmanship. It is a firm foundation on which hundreds of dealers are building a reputation for quality work and quality accessories of all kinds. GARCO is solidly woven. It holds with the grip of a giant till the last shred is entirely gone. For **Safety's** sake, recommend GARCO for every brake lining renewal. When your customer leaves the choice of brake lining up to you, **use GARCO.** Clinch his future business along this line for all time.

GARCO is sold by all Jobbers. Write yours today for our fair-deal proposition. The GARCO Line of Asbestos Auto Specialties is complete. Investigate GARCO Transmission Band Lining for Ford Cars.

General Asbestos & Rubber Company

MAIN OFFICE AND FACTORIES: **CHARLESTON, S. C.**

BRANCHES: 58 Warren St., New York; 311 Water St., Pittsburgh, Pa.; 106 West Lake St., Chicago, Ill.



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Announcement

The fifth annual volume of Motor Trucks of America will be ready for distribution January fifteenth.

To those connected with the Motor Truck industry, this work needs no introduction. Business men in other fields, however, may not know that MOTOR TRUCKS OF AMERICA is a hand-book of over 160 pages, containing photographs and detailed specifications of the principal trucks made in the United States, furnished, checked and approved by the manufacturers themselves. It is therefore the one absolutely authentic survey of the American motor truck industry.

With business in all parts of the country running full blast; with factories working day and night and additions being rushed to completion, never before has it been so necessary to speed up deliveries. Business men are therefore turning to the motor truck, with its greater strength, speed and endurance, to replace less efficient methods of transportation.

MOTOR TRUCKS OF AMERICA has been compiled to help such men select the truck best suited for their requirements. They will find it dependable, up-to-date and free from personal interest of motor truck salesmen.

Our Truck Tire Department will send a copy, without charge, if requested on business letterhead.



THE B. F. GOODRICH COMPANY
AKRON, OHIO

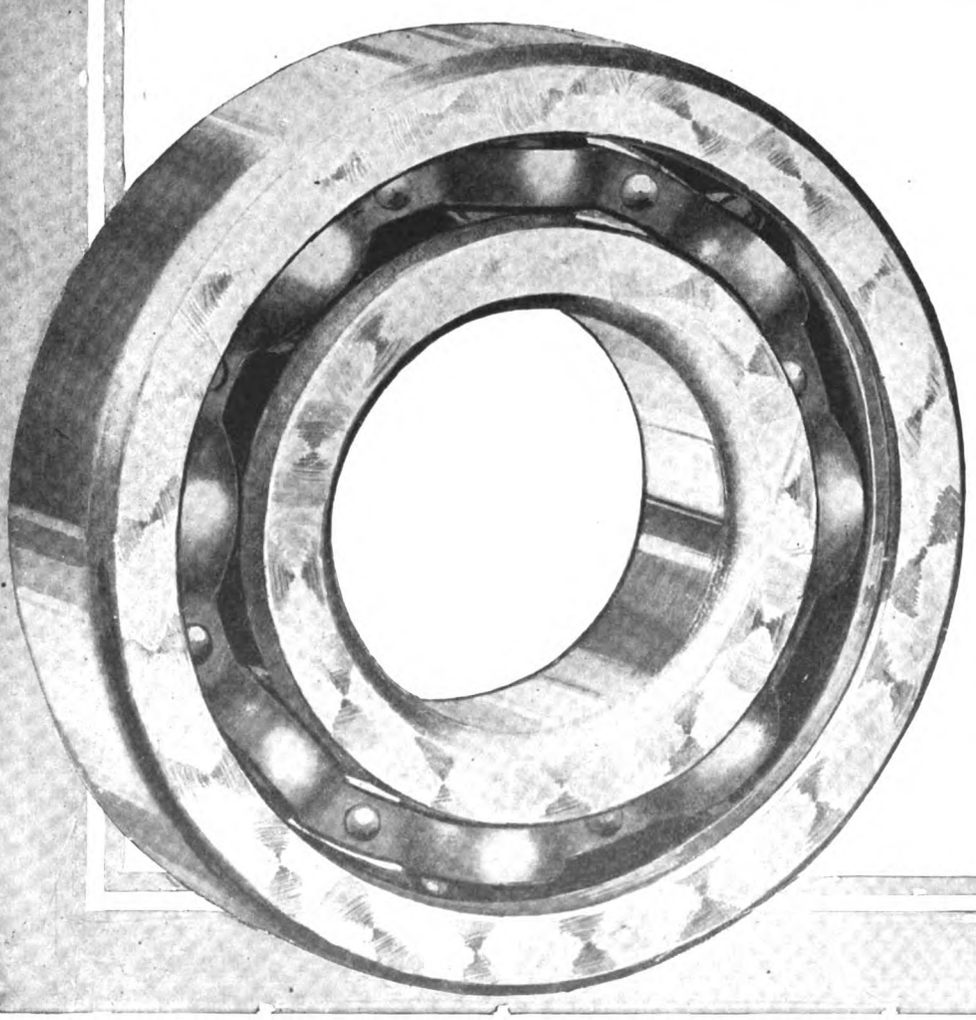
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THIS ENORMOUS, MODERN EQUIPPED, NEW PLANT IS YOUR ASSURANCE BOTH OF QUALITY PRODUCTION AND FAITHFUL ADHERENCE TO DELIVERY SCHEDULES.

¶ It is important first to remember in connection with U. S. Ball Bearings that only quality bearings are produced in this immense plant—one of the largest exclusive ball bearing plants in the world. This is positive assurance that every user of U. S. Ball Bearings receives only one quality bearing—the highest possible of production—for that is the only kind of U. S. Ball Bearings produced.

¶ Of next importance is the fact that deliveries are never promised unless they can be lived up to faithfully. In other words, while our production is great—upwards of 10,000 quality bearings per day—our facilities are such as to enable us to maintain our delivery promises as well as to maintain the quality of the product itself.

¶ And when we speak of quality bearings we mean quality not only of materials used and manufacturing methods employed but of design as well. Each component of every bearing is designed in perfect relation to every other component so that the result is a perfectly balanced bearing — a bearing in which the capacity of the raceways is in absolute balance with the capacity of the balls.



¶ In other words, in the U. S. Ball Bearing you find the most highly developed and most efficient ball bearing known to the manufacturing world — hence the most efficient anti-friction device obtainable.

U. S. BALL BE

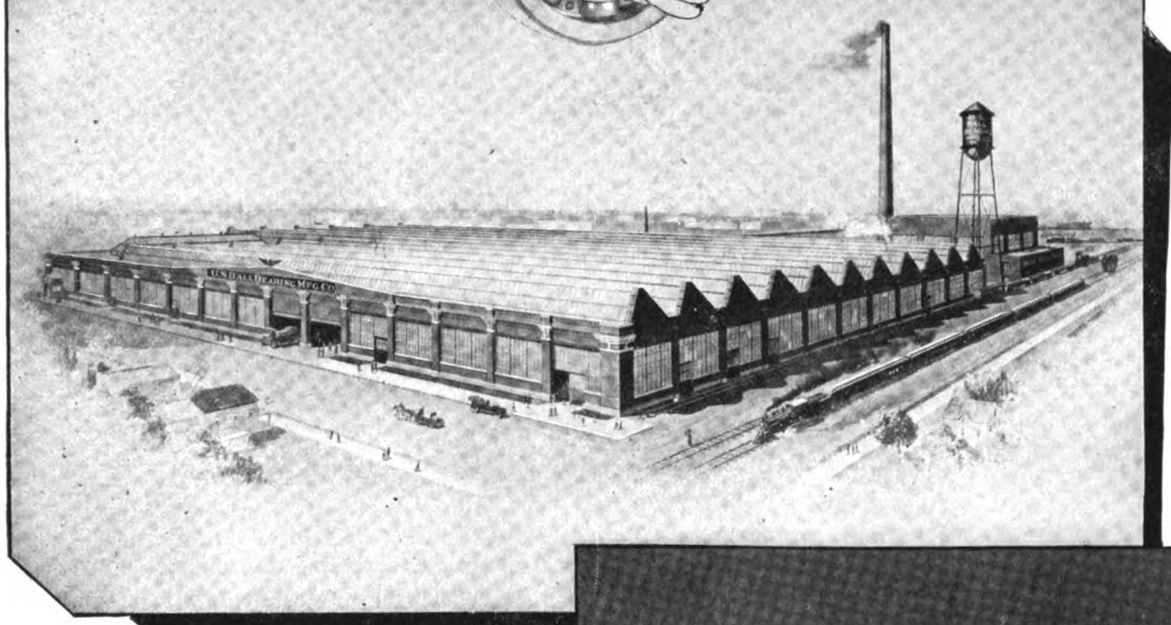
Conrad

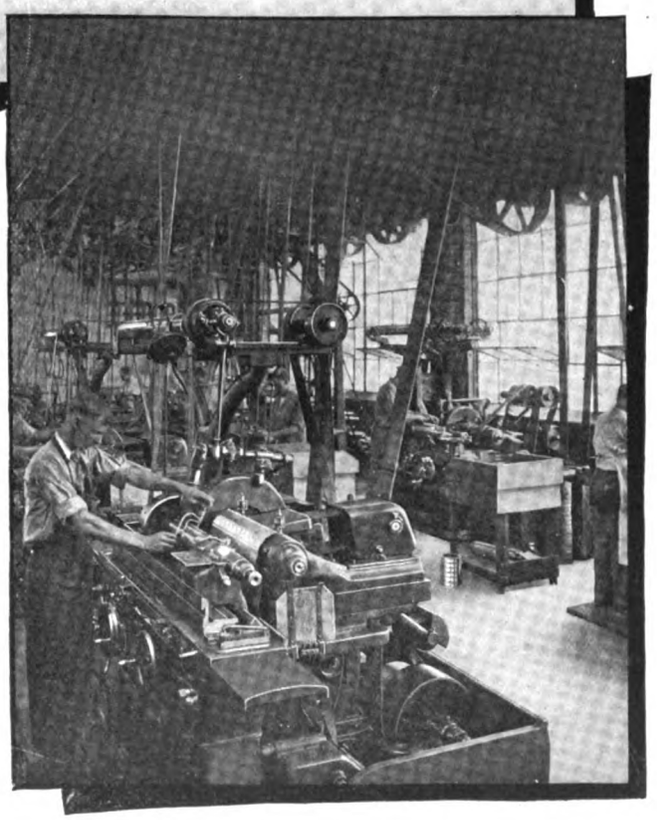
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U.S.

BALL BEARINGS





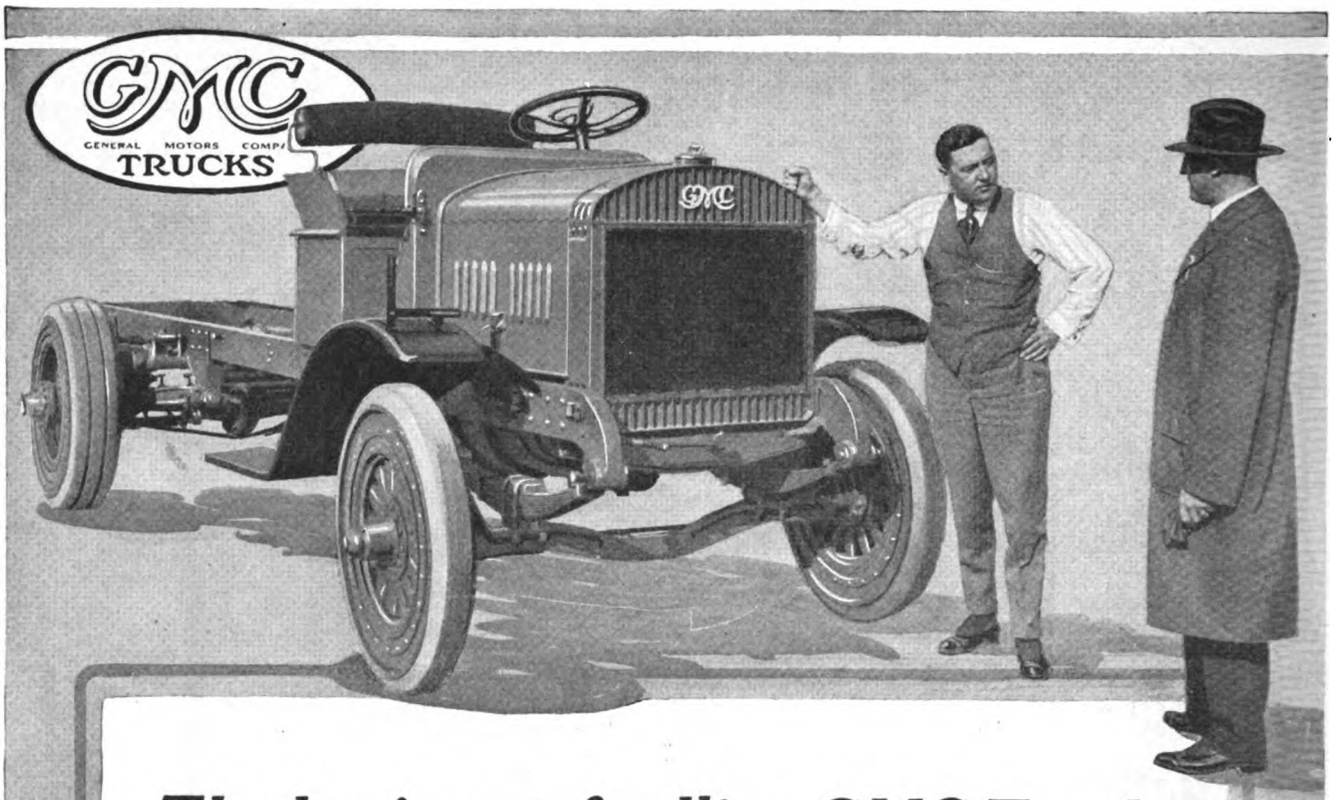
BALL BEARINGS offer least friction to the transmission of power.
BALL BEARINGS offer exceptionally great carrying capacity.
BALL BEARINGS wear longest.
BALL BEARINGS have won every racing classic.
BALL BEARINGS are used by practically every foreign manufacturer.
BALL BEARINGS are always found where efficiency dominates cost.

ARING MFG. CO.

Patent Licensee

mar Avenue, CHICAGO, ILL.

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The business of selling GMC Trucks

GMC dealers in all sections are participating in the rapidly increasing demand for GMC Trucks of all sizes.

Each dealer is building a sound, profitable, satisfactory and enduring business.

Building it on the basis of honest claims—straight-forward dealing and by selling trucks which are **right** in design—**right** in construction and fitted for the work.

There's a lot of satisfaction in selling GMC Trucks—for GMC Trucks make good in service; they are dependable; require only reasonable attention and operate at reasonable cost.

They are simple and understandable—all parts are free from complication. Adjustable parts are accessible and can readily be cared for by the average driver.

Truck owners and prospective truck owners are coming to realize the value of GMC performance and economy, and are coming to appreciate the superiority of GMC construction. The result is an unprecedented GMC demand.

And the GMC dealer is in a position to answer the truck needs of any business for there are all needed sizes in the GMC line—six sizes in all, ¾ to 5 ton capacity.

If you are interested in trucks—either from the standpoint of owner or dealer—we urge you to carefully consider the GMC line.

Write TRUCK HEADQUARTERS for complete information, including records of GMC performance in many varied lines of business.

GENERAL MOTORS TRUCK COMPANY

One of the Units of the General Motors Company

PONTIAC, MICHIGAN

Direct Factory Branches: *New York, Boston, Chicago, Philadelphia, St. Louis*

(140)

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Special Exhibition of recording instruments

Have you ever seen the Dreadnaught and the Recordograf in actual operation? Have you ever had it proved to you that these instruments will positively enable truck owners to cut big slices off their delivery costs?

If not, then be sure to visit the Special Exhibition of these instruments to be held in our offices in New York (Broadway and 57th Street) or Chicago (2728 Michigan Ave.) during the week of the Automobile Show—an exhibition in which we can give you more personal attention than would be possible at the crowded show.

DREADNAUGHT
Indestructible
Hub Odometer

The most accurate and reliable truck-recording device made. It registers every turn of the wheels of the truck—gives exact mileage records and eliminates unproductive mileage.

It's easy to read—figures do not revolve and cannot be obscured by grease or dust. Heavy cast housing protects the mechanism and makes it impervious to jolts, jars, vibration—even to collisions. We'll give you a new one free if you break it.

Trade Marks

RECORDOGRAF
A tape-recording Instrument

gives an accurate tape-record of every move of the truck from the time it leaves the garage in the morning until it returns at night. It shows when the truck is going, when standing still, speed at all times and distance traveled. It's a positive check on both truck and driver during every minute of the day. The Recordograf may be attached to any vehicle. It cannot be altered without detection.

If you cannot come to the exhibit, write for our booklet and prices

AMERICAN TAXIMETER COMPANY

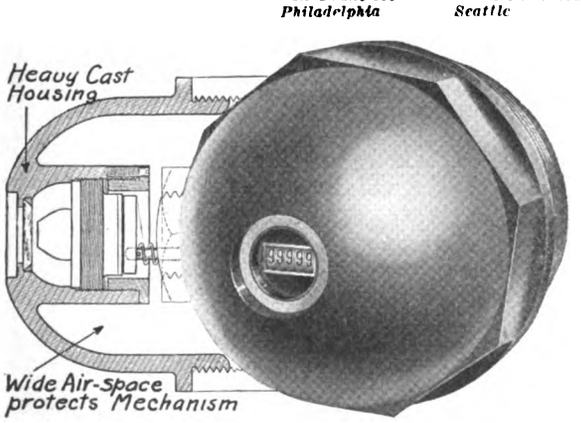
1765 Broadway
New York City

Mfrs. of Jones and Popp Taximeters

Service Stations in the Following Cities:

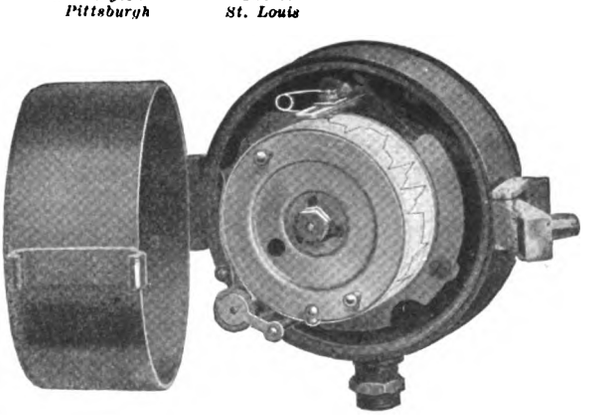
San Francisco, Philadelphia, New Orleans, Seattle, Boston, Washington, Pittsburgh, Detroit, St. Louis

2728 Michigan Ave.
Chicago



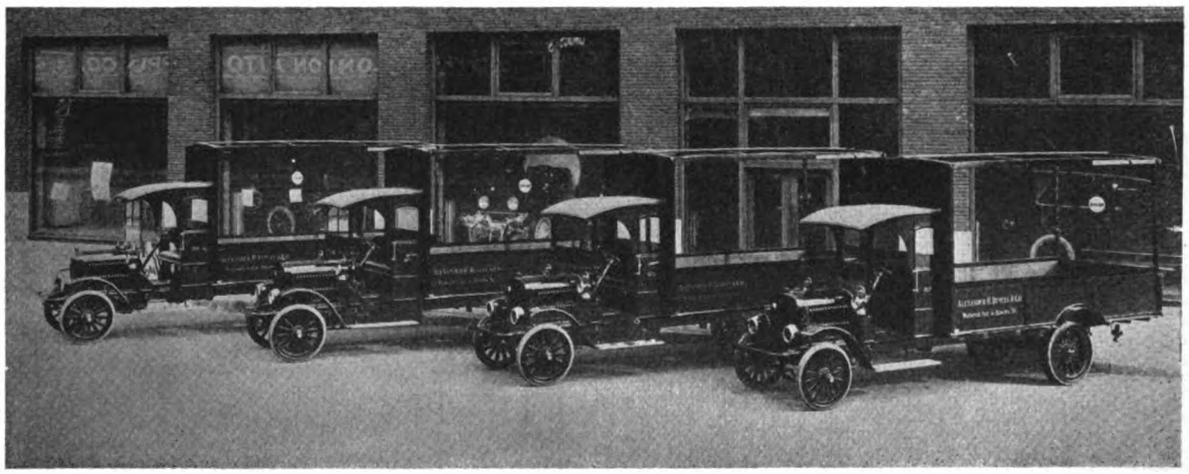
Dreadnaught

Highest awards at Panama-Pacific Exposition



Recordograf

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Fleet of KisselKar Trucks used by Alexander Revell Co., Chicago, Ill.

KISSELKAR TRUCKS

The final choice of purchasing experts in over 200 different lines of business.

The matchless Kissel-built motor, and perfected worm drive rear axle are guaranteed with every KisselKar Truck.

Six sizes from the 1500 lb. Delivery up. Chassis prices $950 to $3350.

KisselKar Truck branches, display rooms and service stations in all principal cities and towns.

KISSELKAR TRUCKS are rapidly becoming the *only* choice among corporations, mercantile institutions and individuals who demand the *utmost* in truck *performance.*

They recognize the necessity of putting their haulage department on an efficiency basis and *keeping it there.*

These are the concerns that are always *ahead* on delivery—not behind.

These are the concerns that meet freight and express schedules *on time.*

These are the concerns that never disappoint their customers, because their KisselKar Trucks *never disappoint them.*

You cannot *afford* to experiment with your transportation department. There is a KisselKar Truck made in the size that will fit your transportation problems perfectly.

Let us send you truck information and data on how KisselKar Trucks will do this.

Dealers—We have a good business proposition to make to those business men who want to get on the front of the truck selling line. Write or wire.

KISSEL MOTOR CAR COMPANY

Hartford, Wisconsin

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The **OTIS ELEVATOR COMPANY** *announces that*

Otis Worm Drive Axles and Electric Steel Wheels will be exhibited for the first time at the forthcoming New York and Chicago Automobile Shows, where truck manufacturers, dealers and users will have excellent opportunity to study and inspect these latest developments in worm drive axles and steel wheels.

Otis Worm Drive Axles will be found to be of most advanced design, embodying many refinements, and both Axles and Wheels of high-grade workmanship and structural quality throughout.

Exhibited on Fourth Floor of Grand Central Palace, first aisle east of main stairway.

Exhibited on Second Floor Rear of Coliseum Annex, Chicago.

Please address all inquiries to
INDUSTRIAL DEPARTMENT

OTIS ELEVATOR COMPANY
ELEVENTH AVE. AND TWENTY-SIXTH ST., NEW YORK

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Your Neighborhood Business can be made city-wide with

Tonford

TRADE MARK

If a one-ton truck will do, a "Tonford" will do better.

—Trade Slogan

$325

F.O.B. DETROIT

MADE IN DETROIT USA

The "Tonford" truck unit, simply and quickly attached to **any** Ford chassis, old or new, gives you a one-ton capacity truck of proven reliability.

It will cut down delivery costs and increase your business.

Inadequate delivery service restricts your trade field. A "Tonford" will make the whole city your "neighbors." You can deliver anywhere quickly and carry a load far beyond the capacity of any truck or delivery car.

Cuts Delivery Cost

It is reducing delivery costs for merchants in every line of business—it will reduce them for you. Make us prove it.

The "Tonford" has Ford strength, Ford economy of operation and upkeep and Ford simplicity.

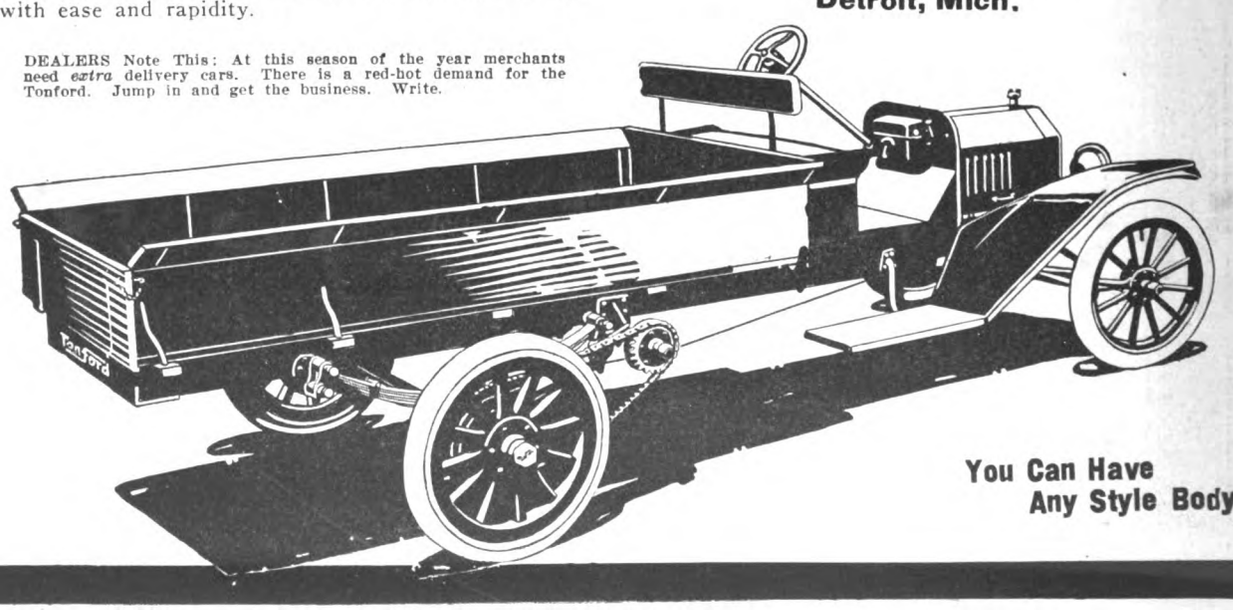
It handles easily—and carries the load up any hill with ease and rapidity.

Should you desire at any time to turn the car back to a pleasure vehicle, the "Tonford" truck unit can easily be detached.

Compare the "Tonford" with the best one-ton trucks in efficiency and economy, and then think of the Tonford price. We will risk your decision, for we know what the "Tonford" is, and what it will do. Write at once for name of nearest "Tonford" dealer.

DETROIT TRUCK CO.
Detroit, Mich.

DEALERS Note This: At this season of the year merchants need *extra* delivery cars. There is a red-hot demand for the Tonford. Jump in and get the business. Write.



You Can Have Any Style Body

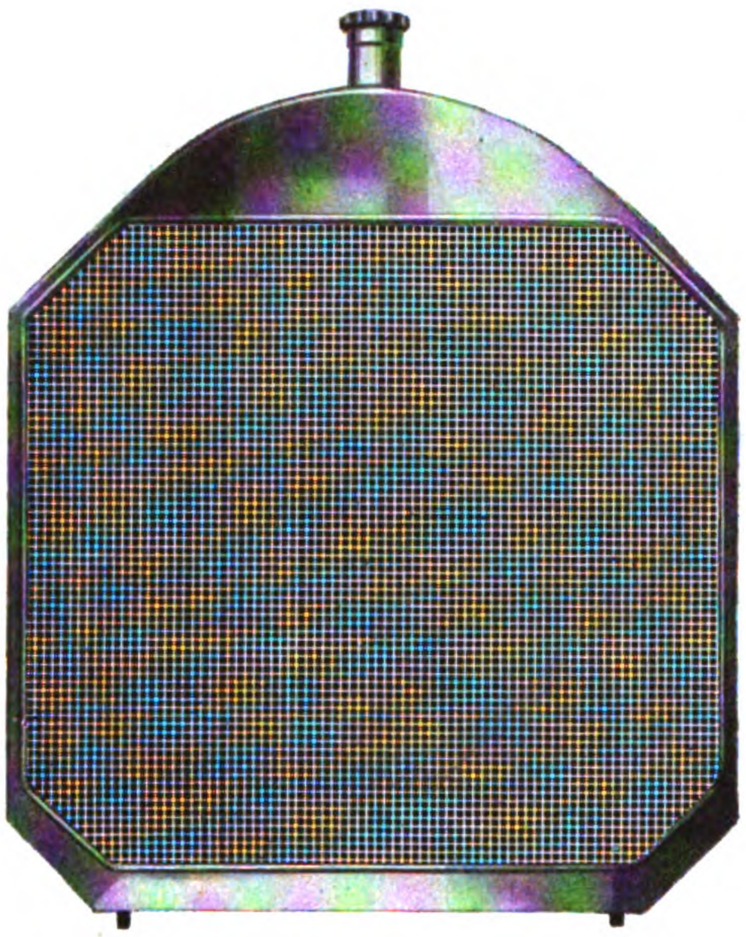
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PLEASE MENTION THE COMMERCIAL VEHICLE WHEN WRITING TO ADVERTISERS

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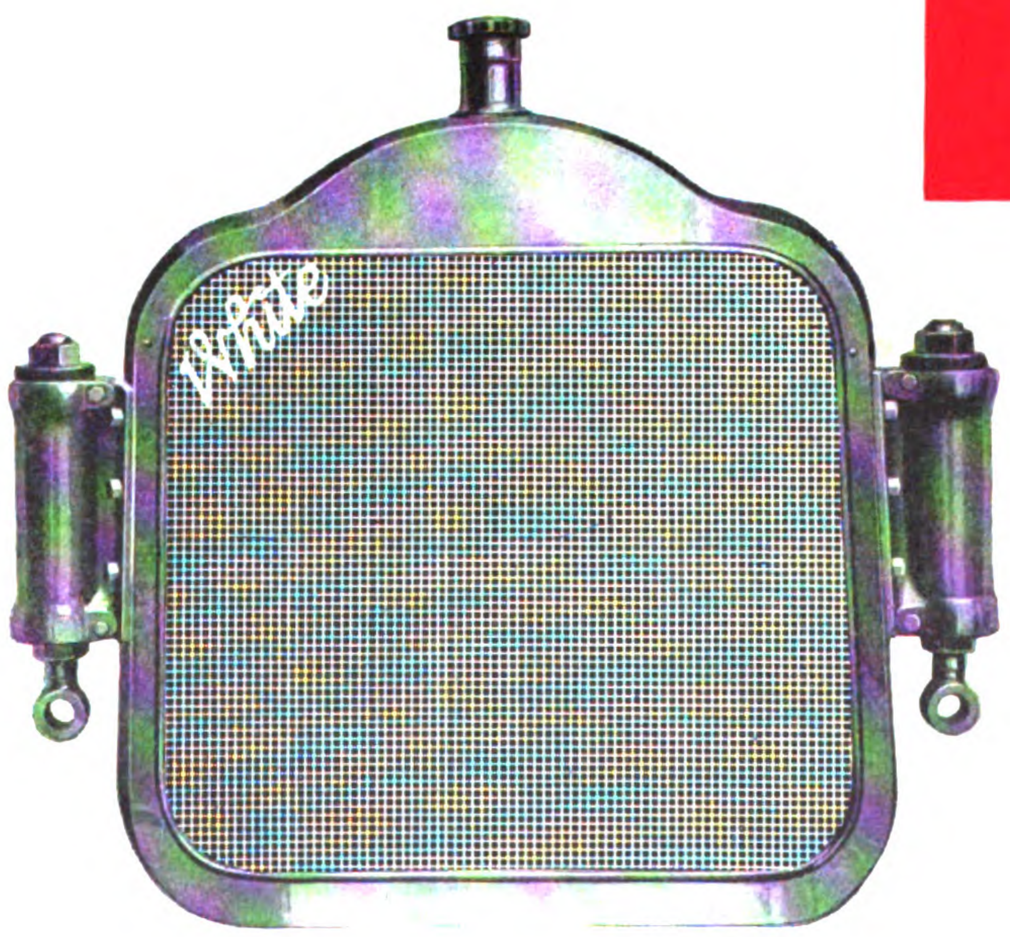
FEDDERS



FOR nearly twenty years Fedders Radiators have been the accepted standard where quality only was considered. For in 1897 the first Fedders Radiator was produced, being used at that time upon what were the quality cars of that day. Since that time Fedders Quality has been an accepted fact, as evidenced in the use of Fedders Radiators by most of the quality car makers ever since.

¶ It is also gratifying to be able to say in substantiation of this claim that many of those manufacturers who started with Fedders almost at the inception of the industry are still confirmed users of Fedders Radiators—most of them having been Fedders users without change during all these years.

¶ In addition to this is the further fact that among our customers are dozens of others who, starting in the industry more recently, have steadily and consistently depended upon Fedders for their radiators.





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RADIATORS

AT the present time the list of Fedders users numbers about seventy-five, including trucks and tractors. In this connection it is interesting to note that not only is this quality product represented upon an imposing list of pleasure cars, but in the heavy duty service demanded of trucks and tractors, there, too, will you find Fedders Radiators doing valiant service.

¶ While there has never been any effort made to identify Fedders with the racing game, many of the world's track and cross-country records are held by cars equipped with regular stock Fedders Radiators—in most cases these records having been set up without the factory knowing their radiators were being used for this special work.

FEDDERS MANUFACTURING COMPANY, Inc.

Buffalo New York







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Ask Them -

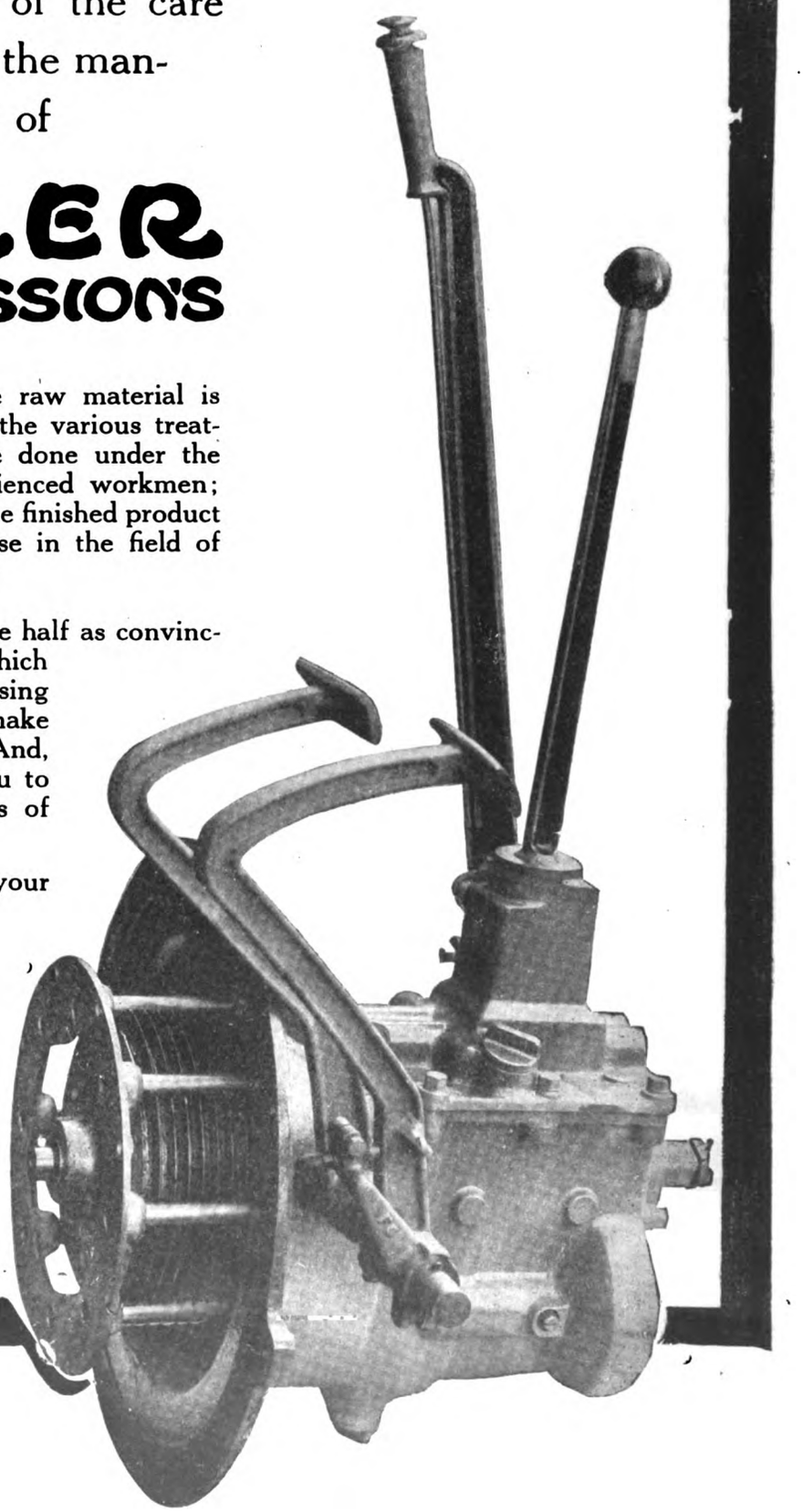
We can tell you of the care that is used in the manufacture of

FULLER TRANSMISSIONS

We can explain how the raw material is tested and selected; how the various treatments and machining are done under the close inspection of experienced workmen; and we can tell you how the finished product stands up under actual use in the field of commercial delivery—but

Nothing we can say will be half as convincing as the statements which manufacturers of trucks, using our transmissions, will make concerning our product. And, better still, we'll refer you to the owners and operators of those trucks.

Ask us for a few names in your vicinity.

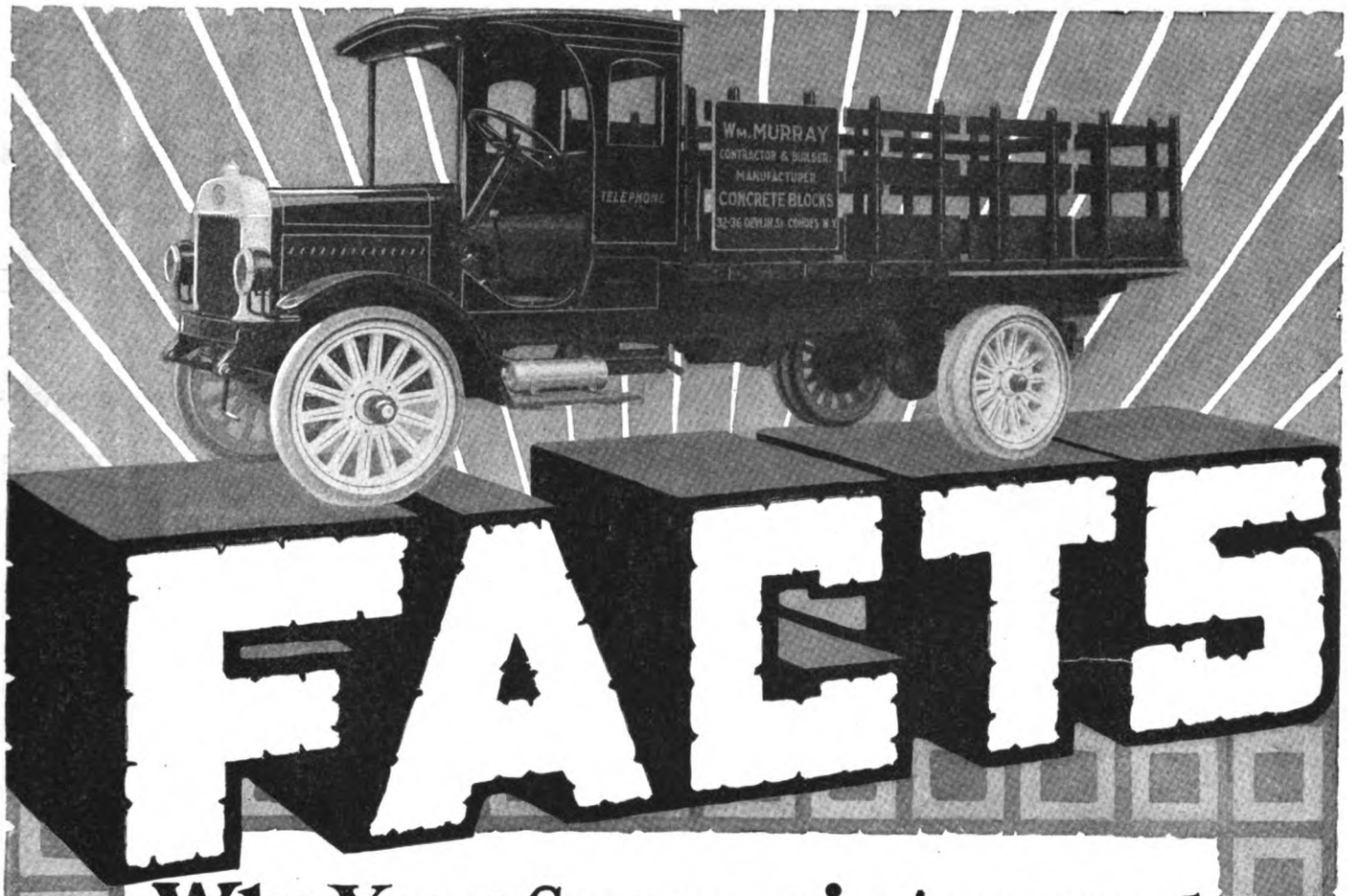


Fuller & Sons Mfg. Company

Kalamazoo, Mich.

Eastern Representatives, Earle & Boggs, Inc., 1790 Broadway, N.Y. C.

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FACTS

Why Your Success is Assured

FACTS—Facts only—sell the business man of today.

He demands Facts that are incontrovertible;—they form the *only* argument that will impress him.

No facts are so evident, so unquestionable, as Facts embodied in a mechanism of cold steel. No argument is so persuasive as a statement of a recorded performance.

Facts which prove themselves are inherent in Gramm-Bernstein Trucks. Back of these trucks is an international reputation for quality, absolutely unequalled. Back of them, too, are brains, sixteen years of truck building experience, and excellent manufacturing facilities—the name itself is a powerful argument for the Gramm-Bernstein Motor Trucks.

The Gramm-Bernstein line is complete, comprising 1, 1½, 2, 2½, 3½, 5 and 6 ton trucks. A Gramm-Bernstein agent is ready to meet the demand of the small retailer as well as that of the great contractor—to sell one truck, or a fleet of trucks.

Strength, Power, Economy, Simplicity, Surety of Operation, Continuous Service—these are facts which in Gramm-Bernstein Motor Trucks are expressed in mechanical units, each proving its own superiority. These are facts which have won for the Gramm-Bernstein line international recognition as the world's best in motor trucks.

Gramm-Bernstein transmissions and control are not only simple—they are positively trouble and error-proof.

Facts such as these are present in Gramm-Bernstein Trucks—trucks which bring profit to the dealer.

Because of the Gramm-Bernstein sales policy, the most generous, most profitable sales policy ever put up to any ambitious man or firm and—

Because Gramm-Bernstein complete line (1 to 6 tons), trucks upheld by a reputation which in turn they fully uphold, are easy to sell, for they virtually sell themselves.

Pioneers for 16 Years

The Gramm-Bernstein Motor Truck Company

Lima, Ohio U.S.A.

THE GRAMM-BERNSTEIN MOTOR TRUCK COMPANY—LIMA-OHIO-U.S.A.
GRAMM BERNSTEIN
MANUFACTURERS OF HIGH GRADE WORM DRIVE MOTOR TRUCKS — 1-1½-2-2½-3½-5-6 TONS

The Gramm-Bernstein Motor Truck Company, 13 Gramm Boulevard Lima, Ohio, U.S.A.

Please send me complete explanation of your new sales policy on Gramm-Bernstein Trucks, including reasons why it will pay me to handle the line; the advertising you will do for me in my local papers; the Dealer Sales Service, etc.

Name .....

.....

Street and Number.....

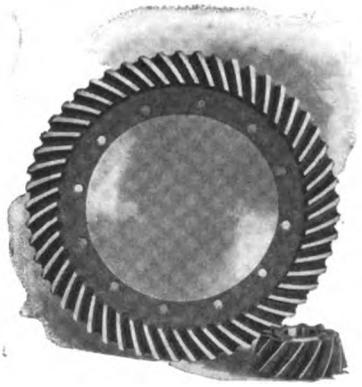
City..... State.....

I (am / am not) representing a truck at the present time.

If you are representing a truck at present, please give the name of it here.

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BROWN-



Here is the list of manufacturers who use Brown-Lipe Products—differentials and transmissions—in the construction of their motor cars and motor trucks

Abbott Motor Car Co.
Acason Motor Truck Co.
Acme Wagon Co.
Ahrens Fox Eng. Co.
Amboy Motor Truck Co.
American Express Co.
Anderson Elec. Car Co.
Armleder, O., Co.
Atlantic Elec. Vehicle Co.
Atlantic Refining Co.
Atterbury Motor Car Co.
Auburn Automobile Co.
Autocar Co.
Auto Construction & Eng. Co.
Automatic Transportation Co.
Available Truck Co.

Baker R. & L. Co.
Barker, C. L.
Barley Mfg. Co.
Bartholomew Co.
Bessemer Motor Truck Co.
Bowling Green Motor Truck Co.
Brockway Motor Truck Co.
Buick Motor Co.

Cadillac Auto Truck Co.
Cadillac Motor Car Co.
Case T. M. Co., J. I.
Chandler Motor Car Co.
Chase Motor Truck Co.
Chester County Motor Truck Co.
Chevrolet Motor Co.
Chicago Pneumatic Tool Co.
Cole Motor Car Co.
Coleman Carriage Co.
Columbia Taxi Cab Co.
Commerce Motor Car Co.
Corbitt Automobile Co.
Crawford Automobile Co.
Croce Auto Co.
Crossley Motors, Ltd.
Crow Motor Car Co.
Cunningham, Jas., & Son Co.

Daniels Motor Car Co.
Dart Motor Truck Co.
Davis Car Co.
De Kalb Automobile Co.
Detroiter Motor Car Co.
Detroit-Wyandotte Motor Co.
Diamond Motor Car Co.
Doane Motor Truck Co.
Dorris Motor Car Co.
Dort Motor Car Co.
Duplex Power Car Co.

Eclipse Motor Truck Co.
Elgin Motor Car Co.
Empire Automobile Co.
Enger Motor Car Co.

Federal Motor Truck Co.
Fiat Co.
Fifth Ave. Coach Co.
Four Wheel Drive Auto Co.

Gabriel C. & W. Co.
Garford Motor Truck Co.
General Motors Truck Co.
General Vehicle Co.
Gramm-Bernstein Co.
Gramm Motor Truck Co.
Grant Motor Co.

Hahn Motor Truck Co.
Harding Motor Truck Co.
Harvey Motor Truck Works.
Harwood Barley Mfg. Co.
Haynes Automobile Co.
Henderson Bros.
Hendrickson Motor Truck Co.
Holmes Motor Truck Co.
Hudson Motor Car Co.
Hunt Co., C. W.
Hupp Motor Car Co.
Hurlburt Motor Truck Co.

International Harvester Co.
International Motor Co.

Jackson Auto Co.
Jewett Car Co.
Jordan Motor Car Co.

Kelly-Springfield M. T. Co.
King Motor Car Co.
Kissel Motor Car Co.
Kleiber & Co.
Knox Motors Associates.
Krebs Commercial Car Co.

Landshaft Motor Truck Co.
Lewis-Hall Iron Works.
Lexington-Howard Co.
Lippard-Stewart Motor Car Co.
Lozier, H. A., Co.
Luverne Auto Co.

McFarland Motor Co.
Maccar Truck Co.
Martin Carriage Works
Menominee Motor Truck Co.
Mercer Automobile Co.
Meteor Motor Car Co.
Milburn Wagon Co.
Mitchell Motor Car Co.
Moline Automobile Co.
Monroe Motor Co.
Moon Motor Car Co.
Moreland Motor Truck Co.
Motor Trucks, Ltd.
Mutual Motors Co.

National Motor Vehicle Co.
National Steel Car Co.
Nelson & Le Moon.
New England M. T. Co.
Niles Car & Mfg. Co.
Nordyke & Marmon Co.

Oakland Motor Car Co.
Ohio Electric Car Co.
Old Reliable M. T. Co.
Olds Motor Car Co.
Owen Schoenack Co.

Paige-Detroit Motor Car Co.
Palladium Auto Cars, Ltd.
Palmer-Moore Co.
Palmer-Myer Co.
Pathfinder Co.
Paterson Co., W. A.
Peerless Motor Car Co.
Pullman Motor Car Co.

Republic Motor Truck Co.
Riddle Coach & Hearse Co.
Ross Automobile Co.
Rowe Motor Mfg. Co.
Rush Motor Truck Co.

S. G. V.
Sandow Motor Truck Co.
Sanford Motor Truck Co.
Schacht Motor Truck Co., G. A.
Schafer-Decker Co.
Scripps-Booth Co.
Selden Motor Vehicle Co.
Service Motor Truck Co.
Shaw, Walden W., Livery Co.
Signal Motor Truck Co.
Singer Motor Co.
South Bend M. C. Works.
Standard Oil Co.
Standard Steel Car Co.
Standard Motor Truck Co.
Stegeman Motor Car Co.
Sterling Motor Truck Co.
Stewart Motor Corp.
Stutz Motor Car Co.
Sullivan Motor Car Co.

Tait Bros.
Taxicab Service Co.
Tiffin Wagon Co.
Traboid Truck Mfg. Co.
Trafford Eng. Co.
Transport Tractor Co.
Tower Iron Works, R. J.

United Motors Co.
U. S. Carriage Co.
U. S. Motor Truck Co.

Velie Motor Vehicle Co.
Vim Motor Truck Co.

Walker Vehicle Co.
Ward M. V. Co.
Watson Wagon Co.
Way-Cleanse Co.
Westcott Motor Car Co.
Wichita Falls Motor Co.
Wilcox Motor Co., H. E.
Willingham S. Sons, E. G.
Winton Motor Car Co.
Witt-Will Co.

Yellow Cab Co.

Zeitler & Lampson.

BROWN-LIPE GEAR COMPANY

SYRACUSE — TRANSMISSIONS — NEW YORK

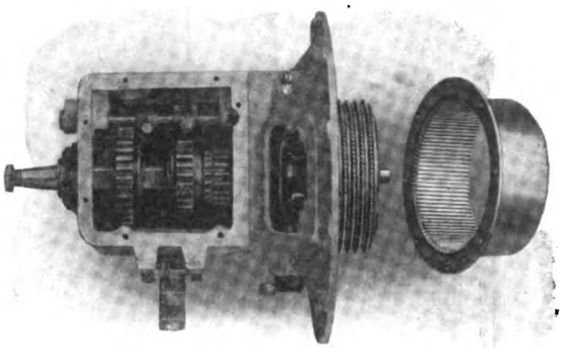
NEW YORK, Thos. J. Wetzel, 29 West 42d St.
SAN FRANCISCO, A. H. Coates, 444 Market St.
CHICAGO, K. Franklin Peterson, 122 S. Michigan Ave.
DETROIT, L. D. Bolton, 2215 Dime Savings Bank Bldg.
Foreign Agent, Benjamin Whittaker, 2, Norfolk Street, Strand, LONDON, W. C.

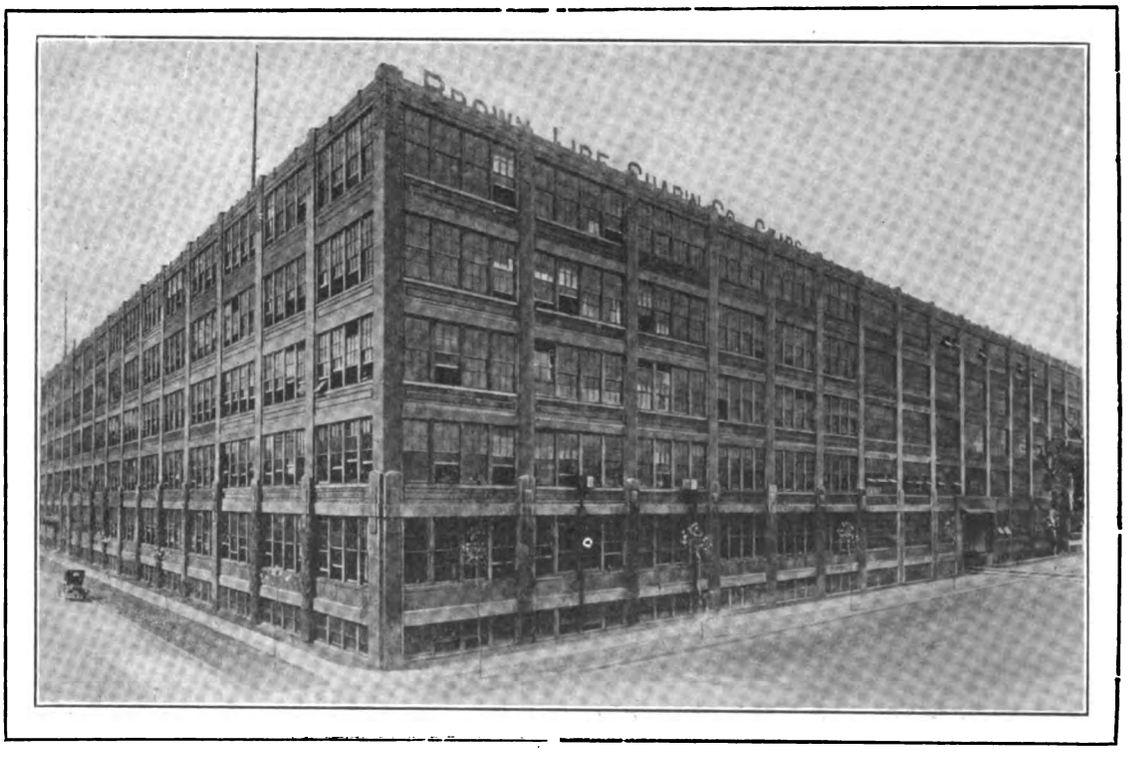
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L I P E

Here is the list of axle makers who use Brown-Lipe differentials in their axles

American Gear & Mfg. Co.
Celfor Tool Co.
Columbia Axle Co.
Cotta Transportation Co.
Hess Spring & Axle Co.
Peru Auto Parts Mfg. Co.
Salisbury Wheel & Axle Co., Inc.
Sheldon Axle & Spring Co.
Timken Detroit Axle Co.
Torbensen Axle Co.
Walker-Weiss Axle Co.
Weston-Mott Co.





BROWN-LIPE CHAPIN COMPANY

SYRACUSE DIFFERENTIALS NEW YORK

NEW YORK, Thos. J. Wetzel, 29 West 42d St.
SAN FRANCISCO, A. H. Coates, 444 Market St.
CHICAGO, K. Franklin Peterson, 122 S. Michigan Ave.
DETROIT, L. D. Bolton, 2215 Dime Savings Bank Bldg.
Foreign Agent, Benjamin Whittaker, 2, Norfolk Street, Strand, LONDON, W. C.

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G. A. Wood takes pleasure in announcing—

"The Baby Wood" HYDRAULIC

(TYPE E)

hoist for small dump trucks, in connection with a special model rear-dump body capable of handling loads up to 3½ tons.

An ideal combination for light hauling and dumping where loads do not regularly exceed this tonnage.

Weight approximately 250 lbs. especially adapted to trucks of 2-ton capacity but equally serviceable for 1- and 3-tonners.

The "Baby Wood" will be known as our type "E" and will embody original features calculated to assure for it an instant reception among the users of light dump trucks.

Production will begin between Jan. 15th and Feb. 1st, next.

All who contemplate placing orders for this type of equipment within the next six months are invited to write to us at once for the further particulars.

Address all inquiries to Detroit.

The Wood Hydraulic Hoist and Body Co.

Sole Manufacturers

NEW YORK **DETROIT** CHICAGO

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Announcing

THE WINTHER

First and Only American-Made Heavy-Duty Internal-Gear-Driven Motor Truck

Dealers and motor truck users, who have long awaited the perfection of an internal-gear-driven motor truck of heavy carrying capacity, will be more than usually interested in the announcement of the WINTHER Truck

Model 57; Maximum, 5000 lbs.
Model 87; Maximum, 8000 lbs.
Model 127; Maximum, 12,000 lbs.

The WINTHER eliminates the noise and annoyance of the cumbersome chain drive. It abolishes the weight and intricacies of the worm.

Built by master builders, from the best American materials, we respectfully submit the WINTHER for your approval.

An exceptionally interesting offer is open for a few high-grade dealers.

Winther Motor Truck Company

Kenosha - - - - - - - - Wisconsin

President and General Manager, Martin P. Winther.

Secretary, Treasurer and Sales Manager, Walter D. Rightmire.

Vice-President and Factory Manager, William H. Martinson. Also Director.

On Board of Directors, Jerry W. DeCou.

Formerly of The Thomas B. Jeffery Company.

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In Far Off N



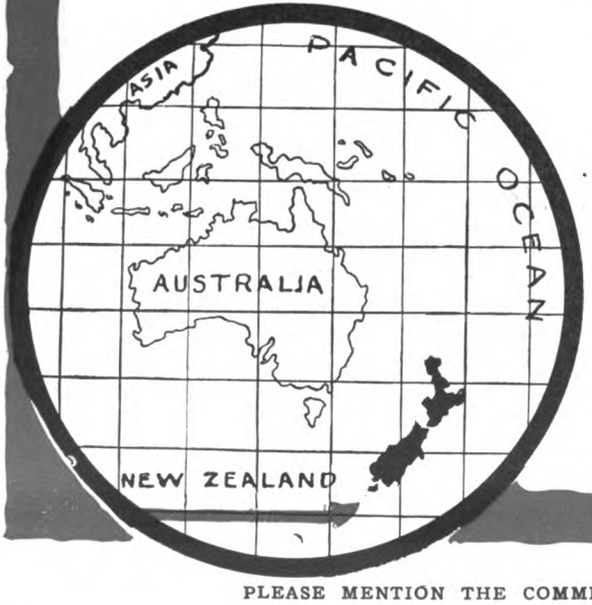
COMMERCE TRUCKS MAKE GOOD UNDER EXTRAORDINARY SERVICE IN WELLINGTON, NEW ZEALAND.



1500 Pounds

Complete Choice of 3 Bodies

$975



THE upper photograph shows a COMMERCE truck operated by the Corporation Tramways of Wellington—a municipal organization.

These trucks collect luggage for conveyance to trains and steamers. They were selected from a vast field by the municipal engineer of the City of Wellington.

The lower illustration is that of a COMMERCE car used by the Wairarapa Farmers Co-operative Association for the conveyance of stores over the rough roads to the outlying districts.

J. B. Clarkson & Co., Commerce dealers, say that all COMMERCE trucks are giving wide satisfaction throughout New Zealand.

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ew Zealand

Commerce

One Ton Completely equipped with Starting and Lighting System, Windshield, Stewart Vacuum System, Bumper, Pierce Governor and Open Express Body—Internal Gear Drive. **$1175**

In addition to the 1500 lb. COMMERCE truck which is giving such universal satisfaction, both here and abroad, there has been added to the COMMERCE line a one-ton internal gear driven job. This one-ton COMMERCE truck is the most complete truck on the market—even including Remy starting and lighting equipment—and shipped so complete that it can be turned over to the customer the day the dealer receives it.

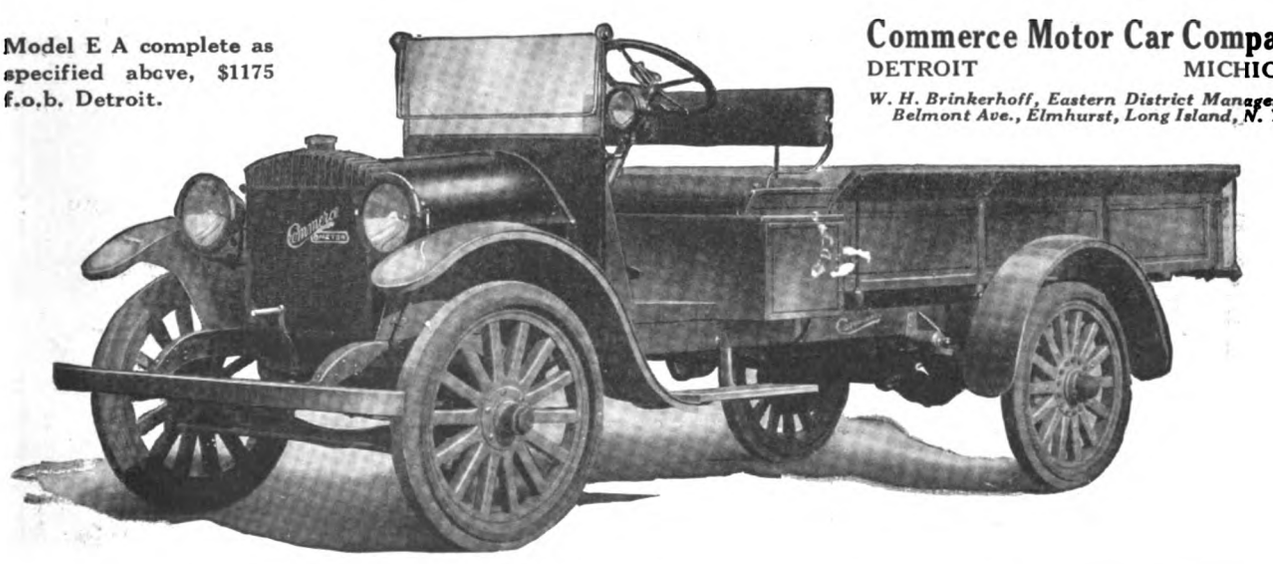
Just a glance at the equipment of this job will show better than words how thoroughly high-grade and complete it is in every detail. In it you will find, Continental Motor; Jacox steering gear; Commerce type cast tank radiator; Torbensen internal gear rear axle; Bock & Bower roller bearings; Remy starting and lighting system with Willard storage battery; Stewart vacuum system; Zenith carbureter; Pierce governor; electric head lights, tail lights and powerful spot light; 2-year guaranteed silico manganese springs and a rigid bumper specially designed. Shipped in two body styles or just the chassis alone, fully painted—fully equipped—ready to be turned over to your customer.

In addition to giving you a line of trucks for which there is a big demand, we have also worked out a plan which provides for financing deferred payment sales, without the payment on the part of the dealer of any commission or brokerage fees, and which also enables the dealer to carry a large stock of trucks if he so desires.

We want a few more dealers to take care of a doubled outfit. We want real live dealers who can handle intelligently a line of trucks that have made good and are rapid sellers.

Let us hear from you today.

Model E A complete as specified above, $1175 f.o.b. Detroit.



Commerce Motor Car Company
DETROIT MICHIGAN
W. H. Brinkerhoff, Eastern District Manager, Belmont Ave., Elmhurst, Long Island, N. Y.

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Become a Part of the Selden Organization

It has been said that this company is discriminating in its selection of dealers. That's true. We don't want every Tom, Dick and Harry to sell

SELDEN TRUCKS

SELDEN TRUCKS · SELDEN · IN-BUILT QUALITY

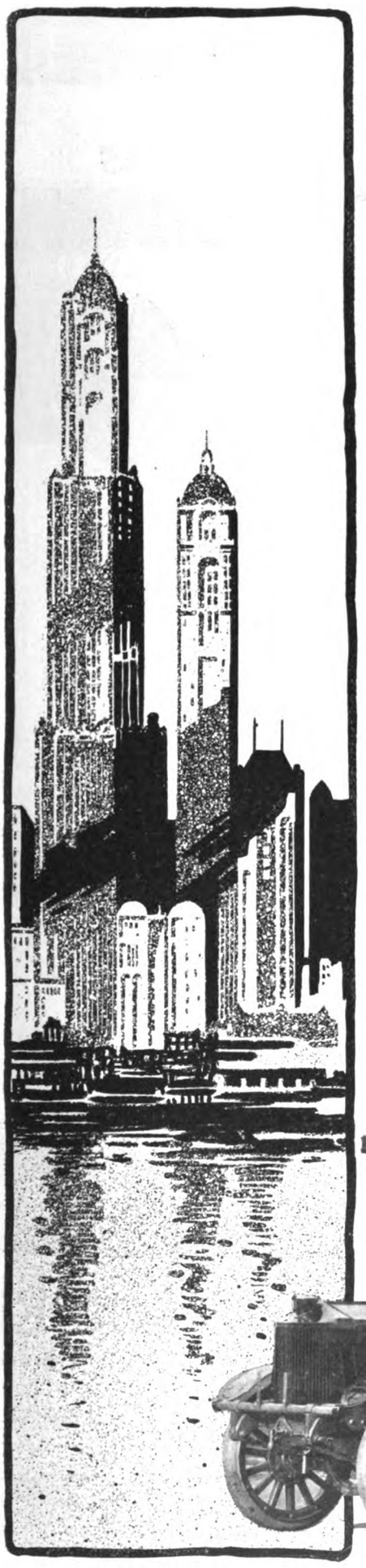
We want live, hustling, dependable dealers who can become a part of the Selden organization, just as they would become a partner in a business. For that is practically what a dealer does when he becomes our representative.

We do more to encourage that feeling among our dealers than any other truck manufacturer is doing today. For we want our representatives to know that we are working for their interests here at the factory just as we want them to work for our interests in the field.

Write for our Territorial Application Blank at once. Perhaps you are the man we are looking for. It may mean Truck Success for you in the future. Do it now.

Selden Truck Sales Co. **Rochester, N. Y., U.S.A.**

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What Do You Think?

WHEN A TRUCK is taken on trial by some of the largest, busiest, most prominent merchants and manufacturers of New York City, including the large express and storage companies; when it is put in to compete side by side with the biggest and best that America's finest truck-makers can produce; when it is naturally viewed with scepticism as a new and untried article—

AND THEN—in exactly these circumstances—it uniformly does so well that these large truck users immediately order more, and write, in answer to inquiries from prospective truck buyers, that: "THIS TRUCK has given us excellent service and **the upkeep cost of same is far less than our other trucks.**"

AND ALL THIS in spite of a purchase price as high as the best of the others—what do you think is the reason? Isn't it worth your while, as a truck owner, to ask for particulars? We shall be glad to furnish them promptly.

To Dealers :

WE OFFER YOU A TRUCK that has been replacing its competitors steadily in the hands of large New York truck owners for the past three years—ever since it was first brought out—on the basis of most satisfactory service at least cost.

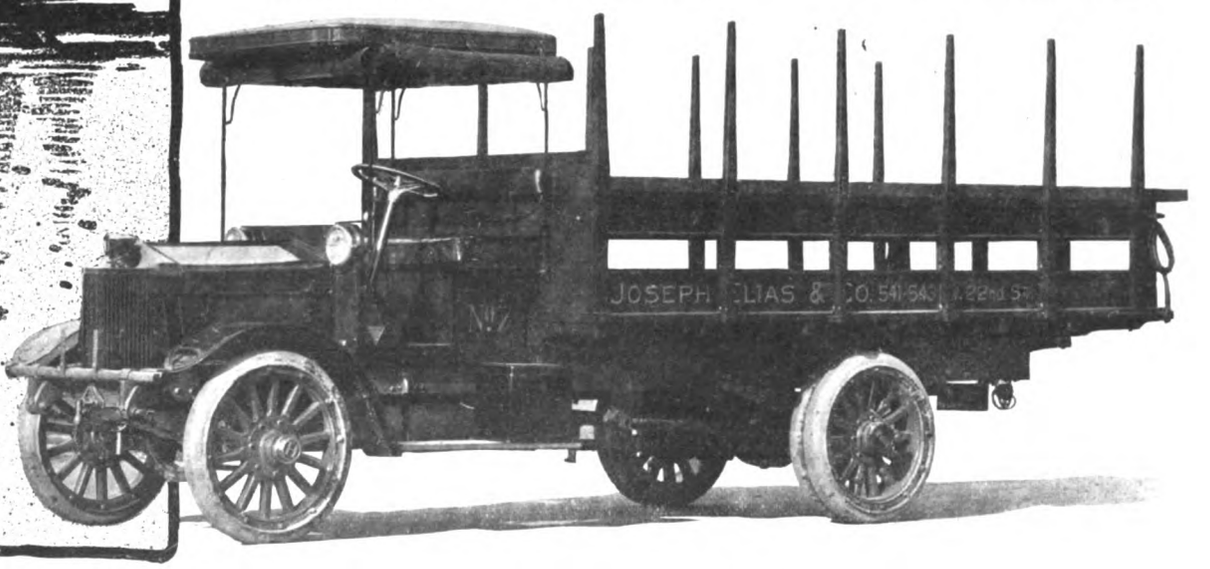
WE OFFER YOU A SERVICE that not only has made and kept many customers, but has turned each one of them into enthusiastic boosters for HURLBURT Trucks, in spite of the fact that the HURLBURT'S price is equal to that of its most distinguished competitors'.

WE OFFER YOU A PERMANENT BUSINESS with attractive profits and the selling rights for a truck that is said by its actual users to have no equal among the other trucks they own.

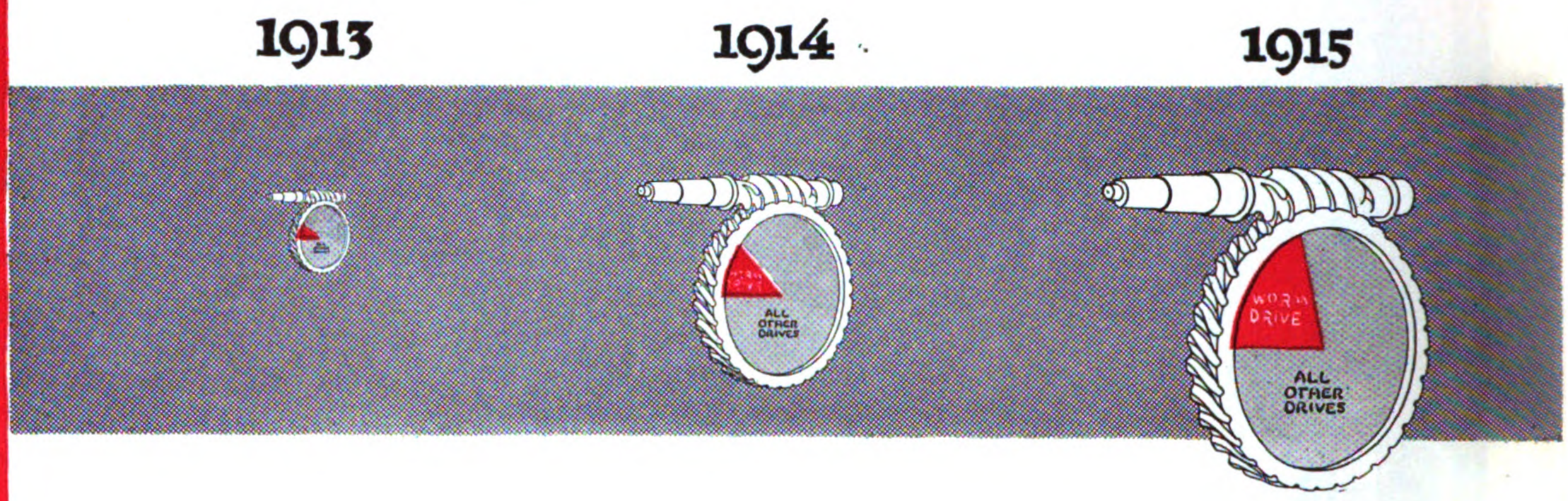
WE SHOULD BE GLAD TO HEAR AT ONCE from good, reliable dealers, who are in position to take up, earnestly and immediately, such a proposition.

Hurlburt Motor Truck Company

Third Avenue and Harlem River, New York City



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Worm Gear Continues to Increase

FOR 1917 almost a 50% increase in the use of worm gear has been registered according to the accepted statistics as compiled from manufacturers' reports. This brings the percentage of worm gear models for 1917 up to 61½% with five other methods of drive dividing the balance.

¶ It should be noted that this is a percentage of models produced—rather than trucks actually produced—the only fair way to estimate, as the other method, that of actual number of trucks produced, will show an even larger percentage in favor of worm gear.

¶ Chain drive has fallen from 79% in 1913 to 69% in 1914, 59% in 1915, 33% in 1916 to 20% in 1917.

¶ The internal gear rose from 1% in 1913 to a little over 12% in 1916, but this year it drops off to less than 10%.

¶ In this same length of time the worm gear has risen steadily from 1% in 1913 to 61½% in the coming year.

SHEL

THE SHELDON AXLE A

Makers of Springs and Ax

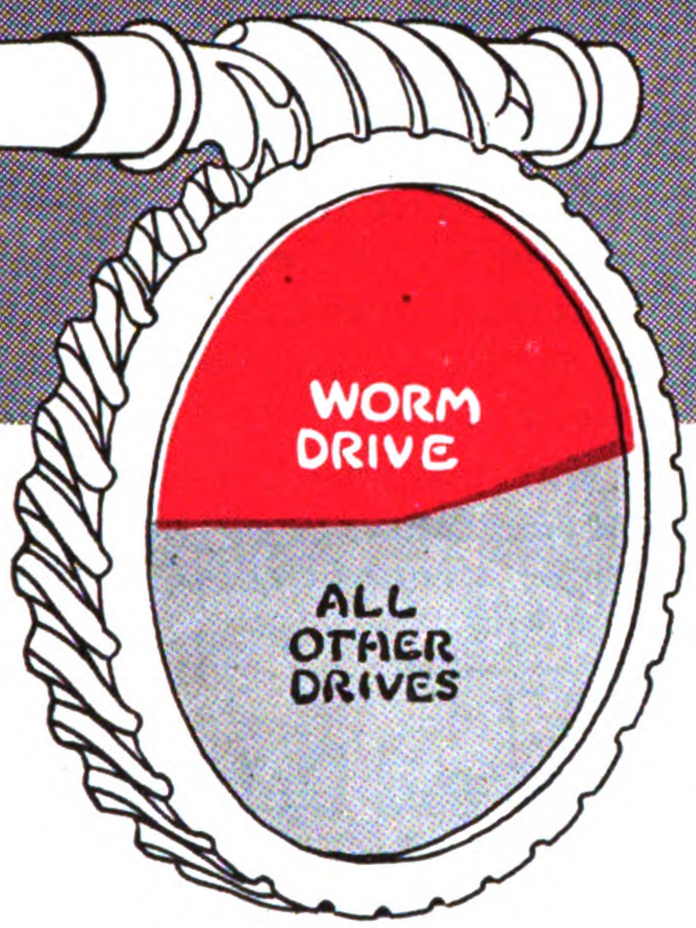
WILKES-BARRE

Chicago: 122 S. Michigan Blvd.

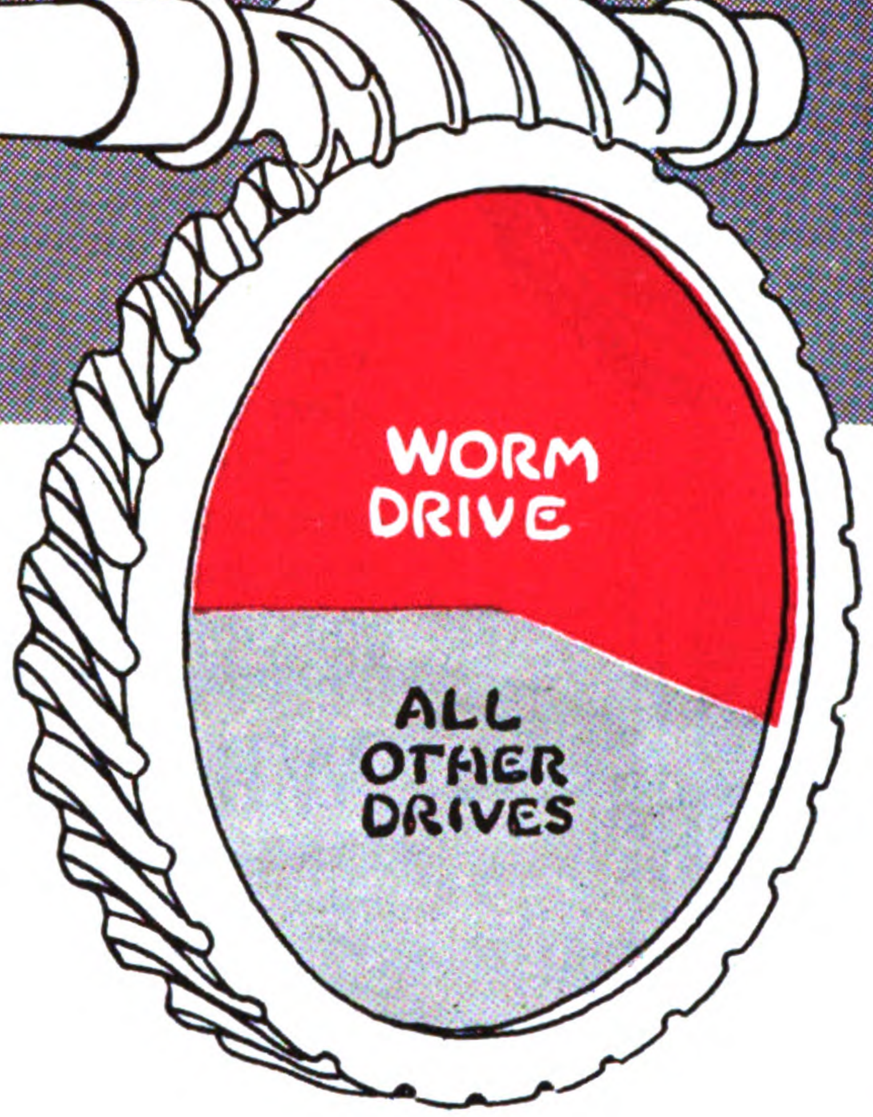
Detroit: 1215

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1916



1917



In other words the marked superiority of the worm and gear as a type of final drive is so thoroughly recognized that nothing can stop its progress and dominancy.

,DON

ND SPRING COMPANY

les for More Than 50 Years

PENNSYLVANIA

Woodward Avenue

San Francisco: 444 Market Street

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ACME
THE TRUCK OF PROVED UNITS

Know Why the Most Successful Truck Dealers Want This Plan!

Faster Sales—Less Expense—Bigger Profits

Is your territory still "open?" Wire today to know—this is your great, immediate opportunity. Offers quicker, greater profits for all of 1917! Keen dealers all over the country instantly endorsed it. It's a tremendous opening for you provided some alert competitor hasn't already closed it.

Established merchants who wired at our previous announcements were astonished at the unusual features of the offer! They now know it's no ordinary agency proposition. It's an actual expense reducing offer—and Acme Trucks—big—powerful—proved—SELL THEMSELVES.

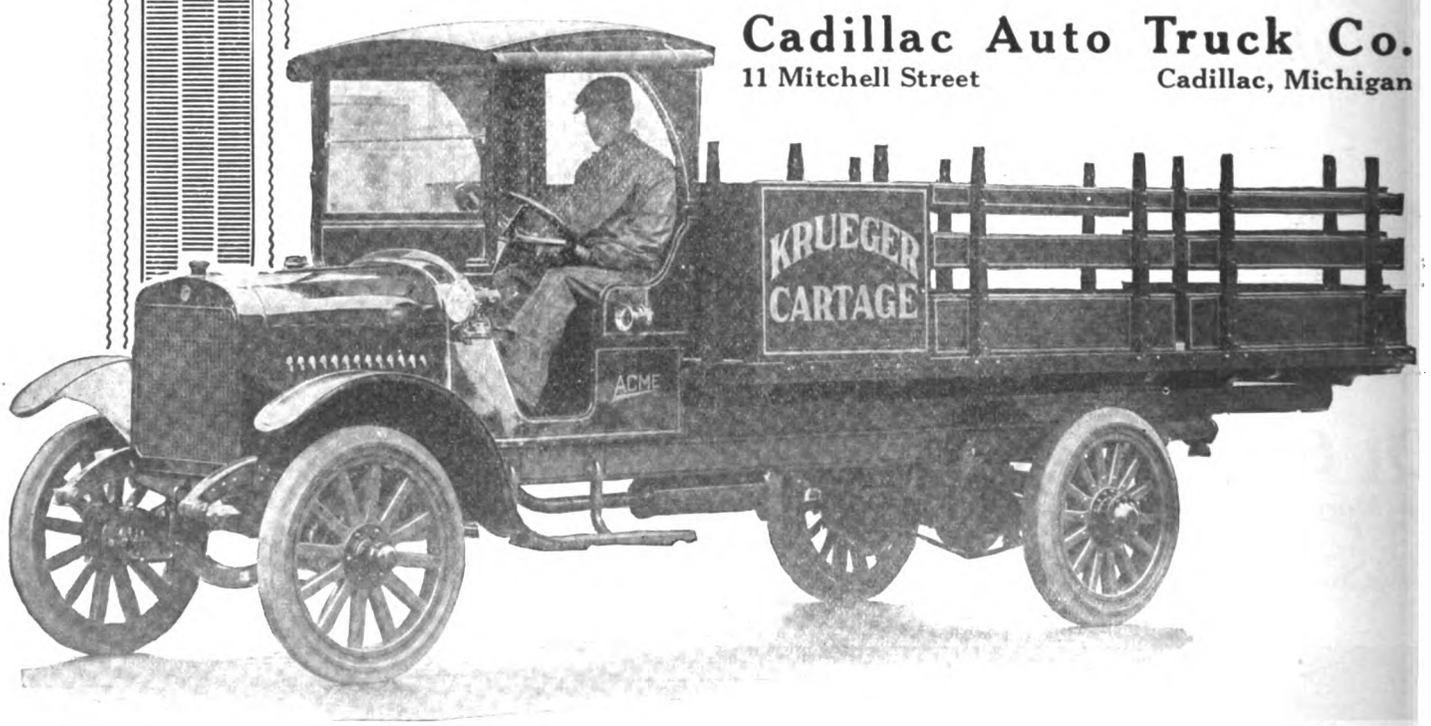
WIRE for Reservation and Details of Plan

You may yet be able to cash in on our new offer. This is the third announcement, and you who seek bigger business need to act quickly. Wire us to reserve your territory. Then study the plan and prove its dollar-saving worth. There's tremendous factory co-operation behind it. For instance, we are going to CONCENTRATE OUR ADVERTISING IN OUR DEALERS' LOCAL PAPERS. That's only one feature.

Acme Trucks are of PROVED UNIT construction—Continental Motor, Timken Axles, Bearings and Worm Drive, etc. Take the 2-Ton Acme for example: 40 H. P. Motor, 148-inch wheelbase, full floating rear axle, easy clutch, 16-inch brakes; chassis 217½ inches over all. Economical in use of oil and gasoline. Your "prospect" CAN SEE THE SERVICE BUILT RIGHT IN THE TRUCK!

Thousands will read this announcement. WIRE and protect your own interests. Your strongest competitor may be interested. WIRE and beat him to it. Get this big plan. Means QUICKER, BIGGER PROFITS.

Cadillac Auto Truck Co.
11 Mitchell Street Cadillac, Michigan



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Our Thanksgiving for the New Year

¶ We are indeed, at this Yuletide Season, deeply thankful for the prosperity the year just closing has brought to the motor truck industry.

¶ We also give thanks that we are on the threshold of a new year of prosperity.

¶ In 1917 we will continue to demonstrate that no principle of mechanical design in the motor truck industry has popularized itself more rapidly and permanently than has the Internal Gear Drive Axle.

¶ Up to 1914 there had been sold in the United States, by two axle manufacturers, 586 Internal Gear Drive Axles.

¶ In 1915 another company commenced the manufacture of Internal Gear Drive Axles, and in that year the combined output of this type of final drive was 3235.

¶ In 1916, the three Internal Gear Axle manufacturers built and sold 19,461 Internal Gear Axles.

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(Continued from preceding page)

¶ RUSSEL Internal Gear Axle production in 1916 increased seven hundred per cent over that of 1915.

¶ From figures obtained from the other two Internal Gear Axle manufacturers, in 1917, the combined production of three companies will be approximately 40,000 Internal Gear Drive Axles.

¶ We have made new additions to our plant and have been able to secure the necessary machinery to double our production during the coming year in order to fulfil our contract specifications for axles.

¶ The Internal Gear Axle has arrived. Actual heavy duty service for three years has demonstrated it to be the most serviceable, economical and durable final drive for motor trucks.

¶ It is with increased enthusiasm that we enter upon a new year of business with unbounded confidence that we are making the best type of rear axle for motor trucks.

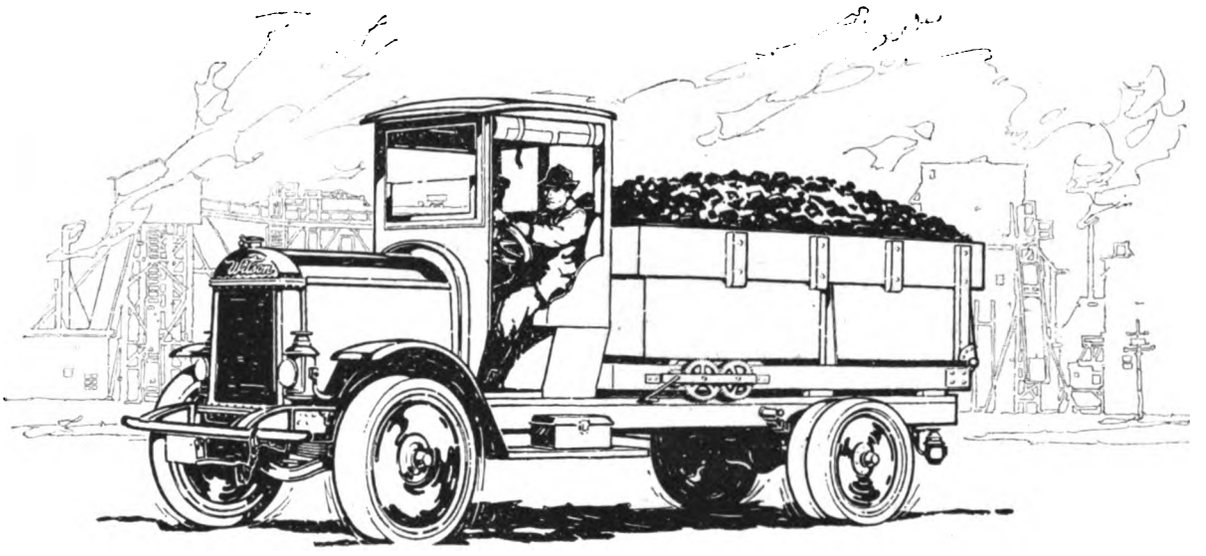
¶ To all those connected with the motor car industry, we extend our heartiest wishes that the New Year brings them even more prosperity than they have enjoyed in the year just closing.

Russel

MOTOR AXLE COMPANY, NORTH DETROIT

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Wilson Motor Trucks



The New One-Ton Wilson

Smaller—but otherwise a duplicate of the standard two-ton Wilson Truck.

Same careful design—same engineering and constructive ability back of it—simply a lighter edition of the Wilson you have come to know as the Standard of motor truck quality.

Wilson now offers you a line that is practically complete—ranging as it does from a carrying capacity of one ton to a haulage capacity of five to six tons.

It is the livest dealer proposition in the motor truck field today.

Better get your application for territory in at once.

J. C. Wilson Company, Detroit, Mich.

Good territory still open for responsible dealers. Sign and mail coupon today.

J. C. WILSON CO., DETROIT *MAIL THIS*

Please send me your Proposition to dealers.

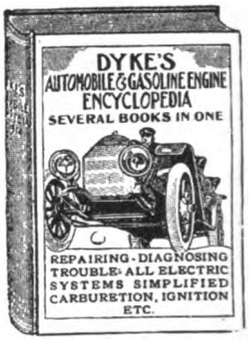
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Address _____

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Mechanical Instruction Books
For the Dealer

DYKE'S AUTOMOBILE and GASOLINE ENGINE ENCYCLOPEDIA



5TH EDITION—JUST OUT

A teacher, guide and reference on everything pertaining to motoring—simple as the A-B-C's.

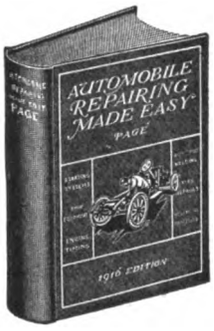
It's worth ten times its cost, if only placed on the shelf and used as a reference.

2370 Illustrations. 824 Pages. 50 Instructions.

Price, $3.00. (Add 25c. to prepay.)

Free—with encyclopedia—a supplement treating on the FORD, PACKARD & KING—part printed in two colors.

AUTOMOBILE REPAIRING MADE EASY



By Victor W. Pagé, M.E.

1000 Specially made Engravings on 500 Plates. 1056 Pages (5½ x 8). 10 Folding Plates.

Price, $3.00 Net.

A Comprehensive, Practical Exposition of Every Phase of Modern Automobile Repairing Practice.

MODERN STARTING, LIGHTING AND IGNITION SYSTEMS

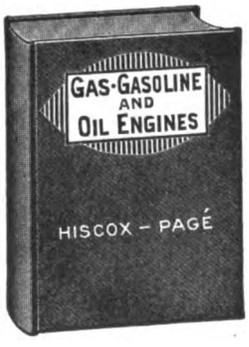


By Victor W. Pagé, M.E.

250 Specially Made Engravings. Nearly 400 (5½ x 8) Pages. Folding Plates. Price $1.50.

A Self-Educator on Electrical Systems. All the leading systems of Starting, Lighting and Ignition have been described and illustrated with the cooperation of the experts employed by the manufacturers. Wiring diagrams are shown in both technical and non-technical forms. All symbols are fully explained. This is a book of real merit.

GAS, GASOLINE and OIL ENGINES



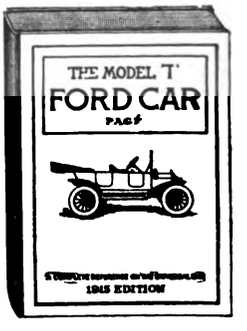
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By Gardner D. Hiscox, M.E.

By Victor W. Pagé, M.E.

Enlarged and Entirely New Edition of this Standard Work. Considers exhaustively all Types of Stationary, Marine, Motor Vehicles and Aerial Power Plants. 640 PAGES, With Folding Plates—435 ILLUSTRATIONS. Price, $2.50 Net.

THE MODEL T FORD CAR



Its Construction, Operation and Repair

By Victor W. Pagé.

300 (5 x 7) pages. Over 100 specially made engravings and two large folding plates.

Price, $1.00

This book is written for FORD DRIVERS and OWNERS, by a recognized automobile engineering authority and an expert on the FORD, who has driven and repaired Ford Cars for a number of years. He writes for the average man in a practical way from actual knowledge. All parts of the Ford Model T Car are described. ALL REPAIR PROCESSES ILLUSTRATED AND FULLY EXPLAINED.

Book Department THE COMMERCIAL VEHICLE 241 W. 39th St., N. Y. C.

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① Strength ② Simplicity ③ Speed

STRENGTH without excessive weight
SIMPLICITY without cheap construction
SPEED without sacrificing Strength or Simplicity

BESSEMER TRUCKS

The requirements of truck users and the interests of truck dealers have been perfectly combined in

A Master Product

which serves each to their mutual advantage.

The Bessemer models represent the highest standard of truck construction.

In design, material and workmanship we have put years of experience and the result is a motor vehicle that under expert examination proves incomparably better than trucks with which it is tested.

We solicit inquiries from the trade and from those who already use trucks or contemplate using them.

One-Ton Internal Gear Shaft Drive $1095 | **Two-Ton Worm Drive $2200** | **Three-and-One-Half-Ton Worm Drive $3100**

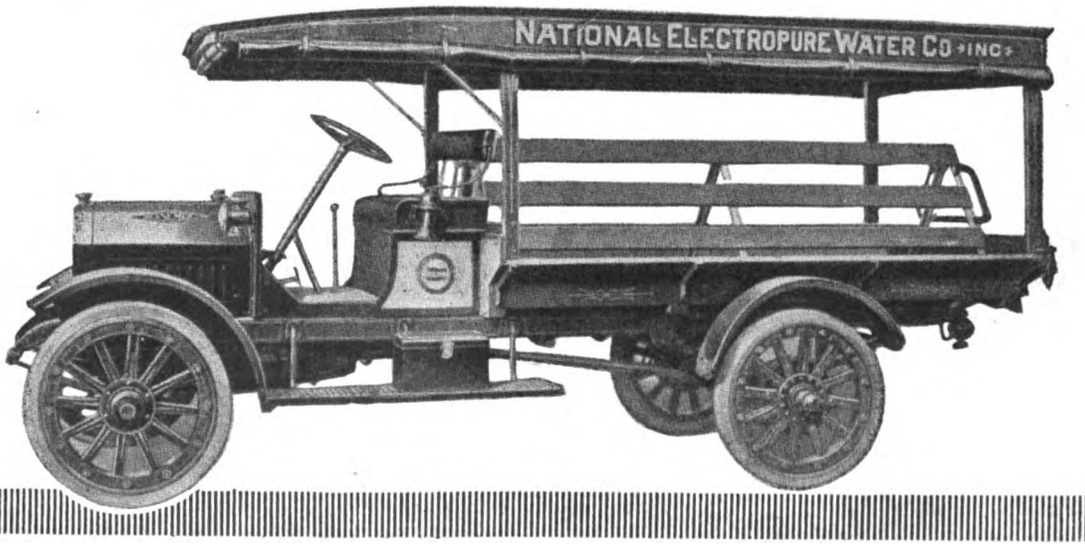
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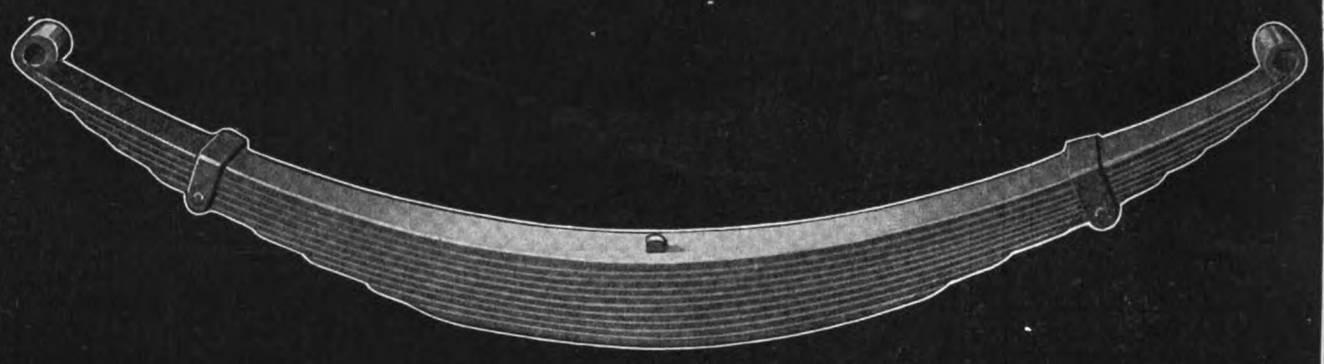
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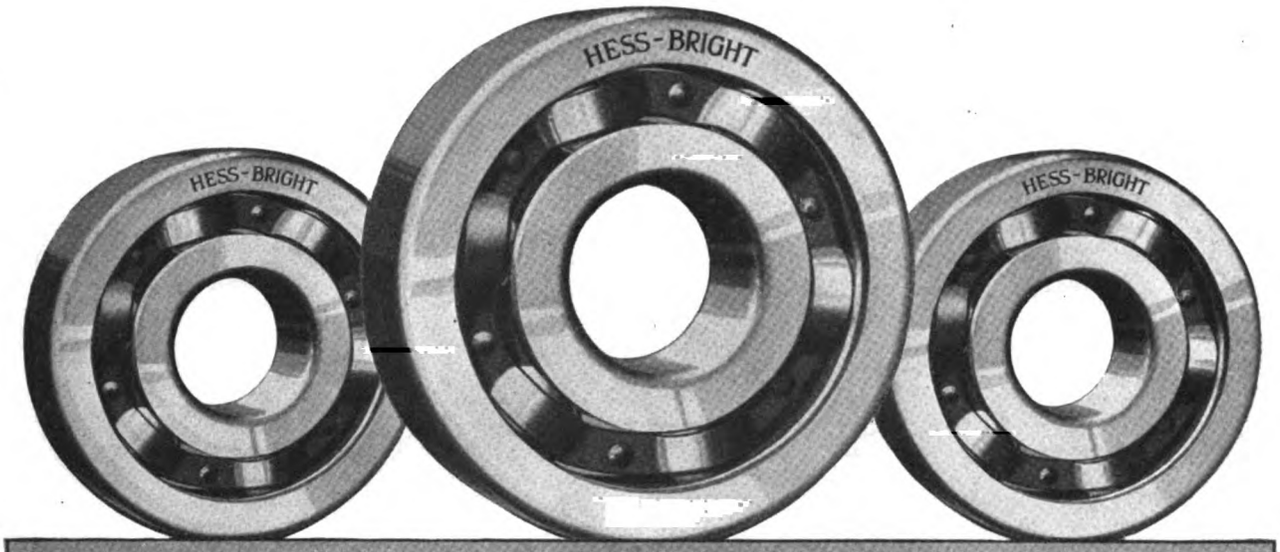
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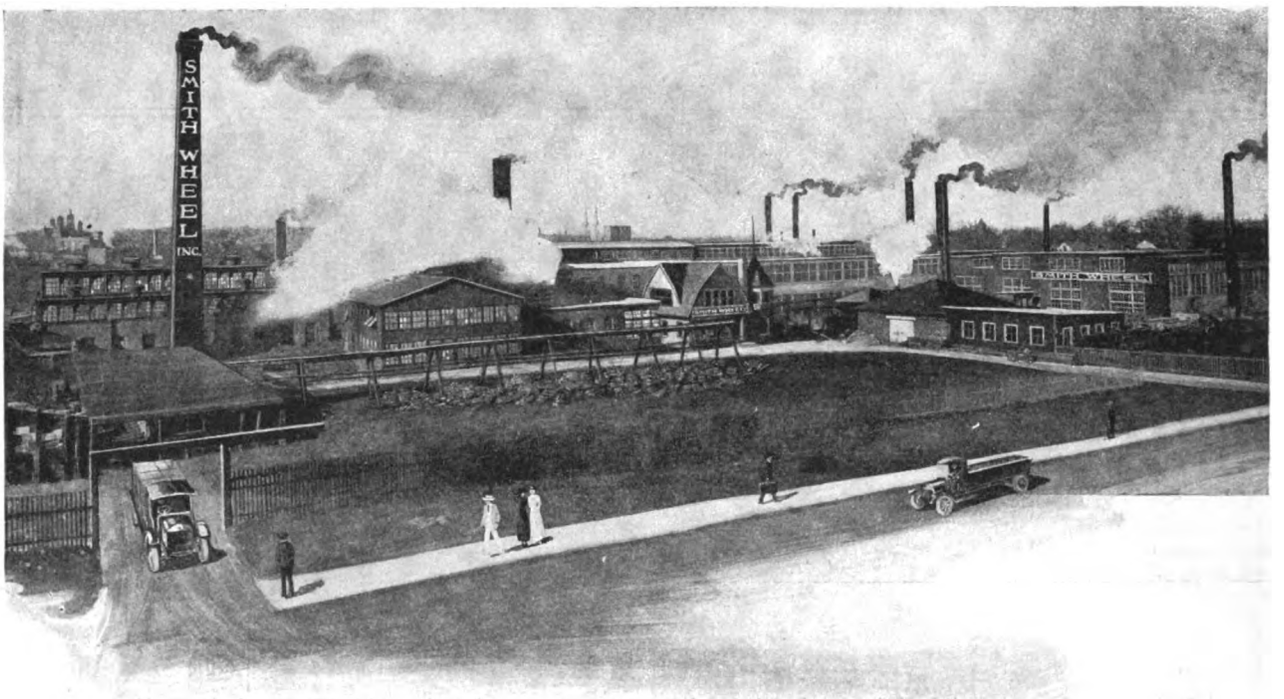
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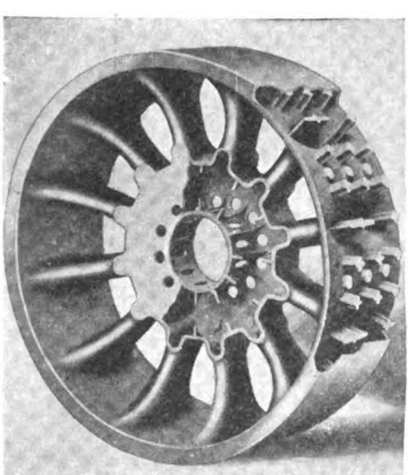
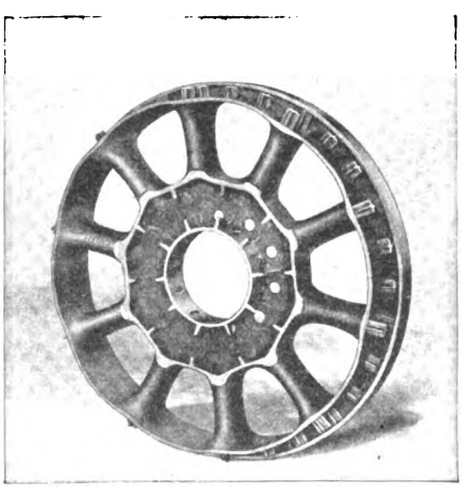
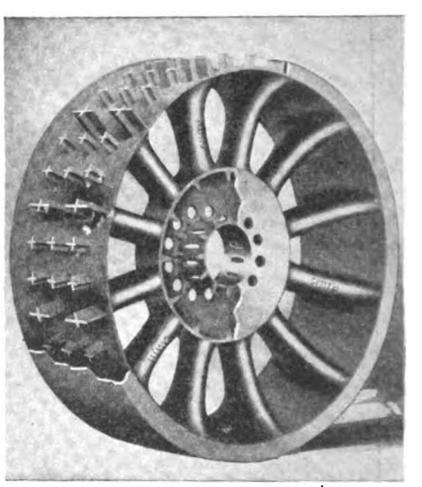
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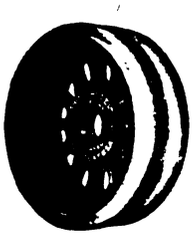
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The COMMERCIAL VEHICLE
Read by Business Men

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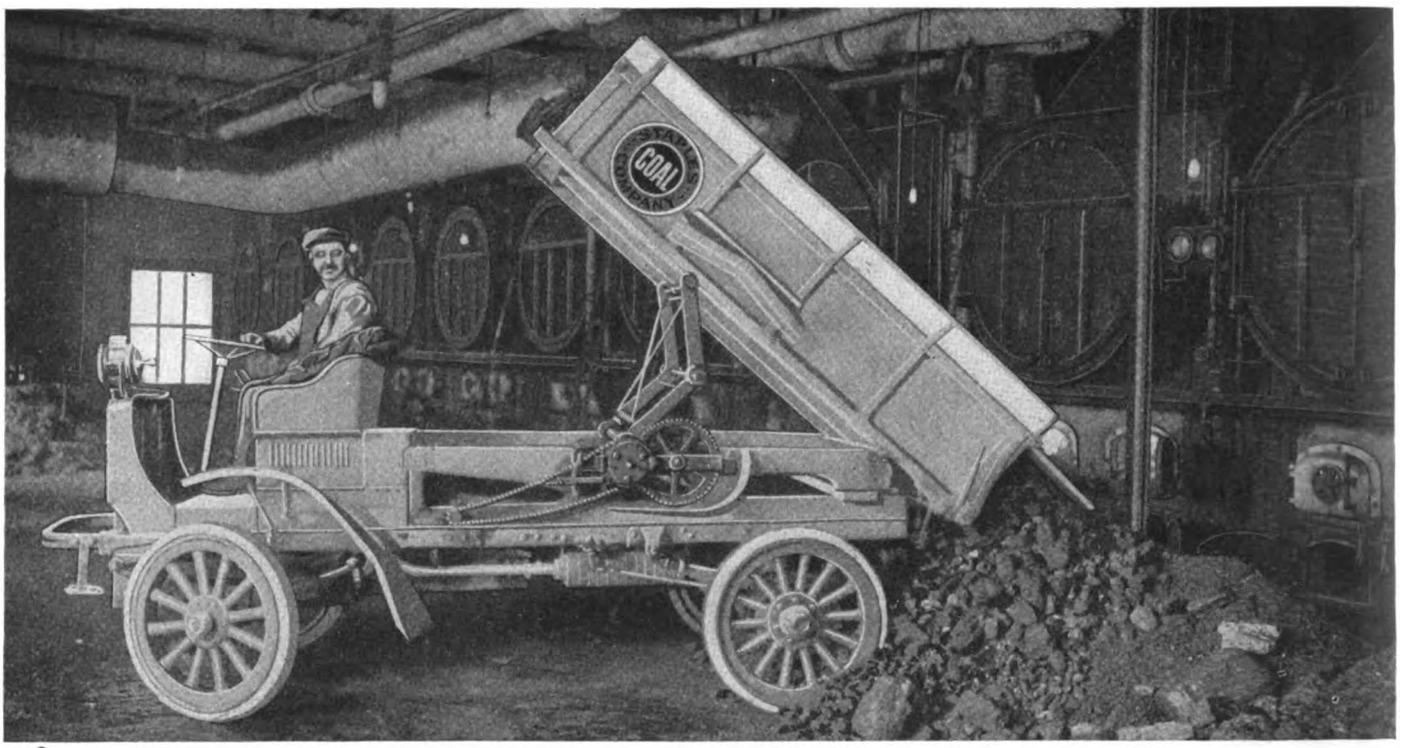
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The COMMERCIAL VEHICLE
Read by Business Men
Vol. XV January 15, 1917 No. 12

Lumber Trade Keeps Pace with Building Development with Trucks

Tremendous Opportunity for Development—Analysis of Retail Requirements and Conditions

By J. Crow Taylor

SOME idea of the magnitude of the lumber business and allied branches of the wood-working industry and the amount of trucking and hauling that may be involved in it is furnished by the statistics of the industry which show in round numbers an annual lumber production of about 40,000,000,000 ft. The average weight will perhaps run a little above 3½ lb., which would give us a round number total for the weight of 150,000,000,000 lb. annually. While this will give a general idea of the magnitude of the business, it does not give any comprehensive outline of the exact amount of trucking or hauling involved or the varieties of truck service called for. Some of the material is handled several times, while some of it goes almost directly into consumption. Also there are many phases, angles and branches to the wood-working industry making it impossible to encompass the entire field in any proposition of trucking or truck service because the requirements of one division may be entirely different from those of another.

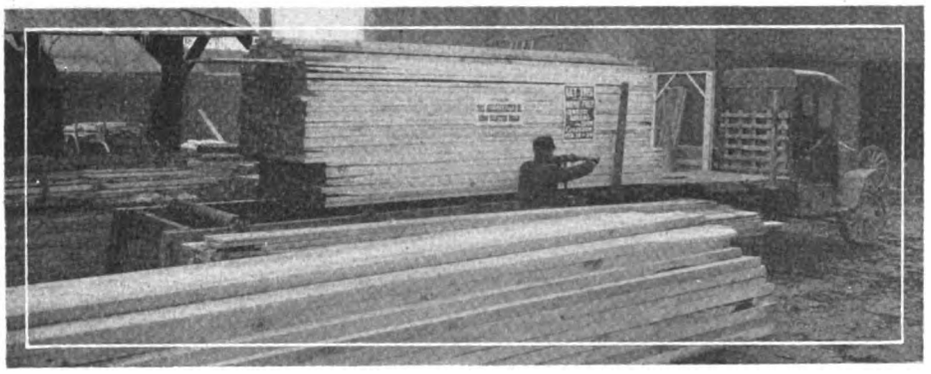
There are perhaps 40,000 sawmills, each of which has several kinds of hauling service in its operations, including the hauling of logs, the hauling of lumber on the yard from the mill to the piles and again from the piles to the planing mill or for loading on cars. From the sawmills about half of the lumber produced goes to various wood-working industries including furniture factories, box factories; in fact, quite a long list of factories which have usually two hauling problems, one of handling the lumber on the yard and from the yard into the factory and the other the hauling of the manufactured product either to customers or freight stations for shipment. In each case or each division of industry the hauling problem is different or rather peculiar to that branch of the industry itself so each must really be considered separately.

Quite a percentage of the lumber product manufactured, perhaps half of it—

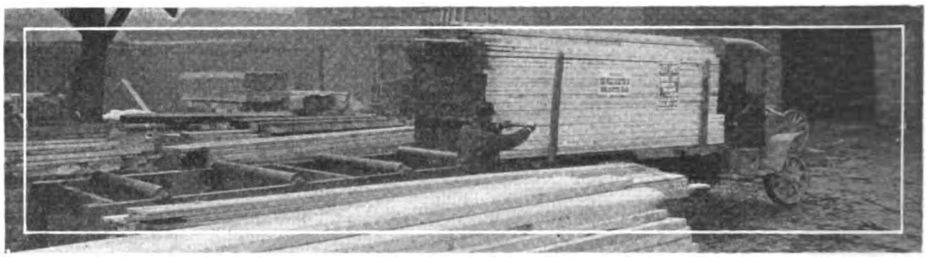


Type of tractor-trailer outfit used by logging concerns. The one shown here is a Mack used by Scearce & Meagher, Seattle, logging contractors, who make a business of hauling logs from the woods, where the timber is cut, to the water or the mills

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How efficiency is attained in lumber delivery. Here is one of the Packards of the Mills-Carlton Co., Louisville, Ky., in the lumber yard receiving its load already stacked by hand from off a roller platform. To the right, the 4 tons of lumber is shown shifted to the truck—and quickly and easily by one man working a crank on one of the rollers



the exact figures are difficult to obtain—goes from the mills to what are known as retail lumber yards, of which there are probably 15,000 or 20,000 throughout the United States, and where it is put in piles in the open or in sheds or warehouses from which it is eventually delivered when sold to jobs where construction work is going on. It is this retail lumber business as one development of the lumber industry that is marked for consideration in the present instance because it constitutes a very interesting field in which the motor truck is making its way and has apparently great future developments before it. Retail lumbermen all over the country are very much interested right now in a study of motor trucking with a view to not only have motor trucks take the place of the horses and wagons for short distance delivery, but also in some measure substitute for the railroads and electric lines in what has heretofore been short railway haul delivery.

The motor truck has already made what might be termed fair progress in the lumber yard field, especially among the yards in the larger cities where paved streets are the rule and where most of the incoming roads are in good shape. In surroundings of this kind about the only difficulty encountered in changing from horses to motor trucks is that of getting from the main highway across open ground to specific points where building operations are under way. Sometimes the ground is soft, making difficulties for the heavily-loaded motor. It is perhaps this more than anything else that has checked the progress of motor trucks into this field.

Even so, however, it is doing very well and gradually this problem is being solved one way and another. Wherever a lumberman has put a truck into service he has become a truck enthusiast and has never gone back to horses or mules. Moreover it has usually been found that there is an actual saving effected in cost as well as many other advantages which accrue from the use of trucks for delivering lumber and other building material that goes along with it.

Perhaps more rapid progress would have been made had the truck people started in earlier to make a special study of the needs of the lumber yard in the way of trucks. Quite a number of them are making a study of it now and they are naturally making better progress as well as furnishing trucks that serve the needs of the retail lumber yard better than if no study had been given to these peculiar needs.

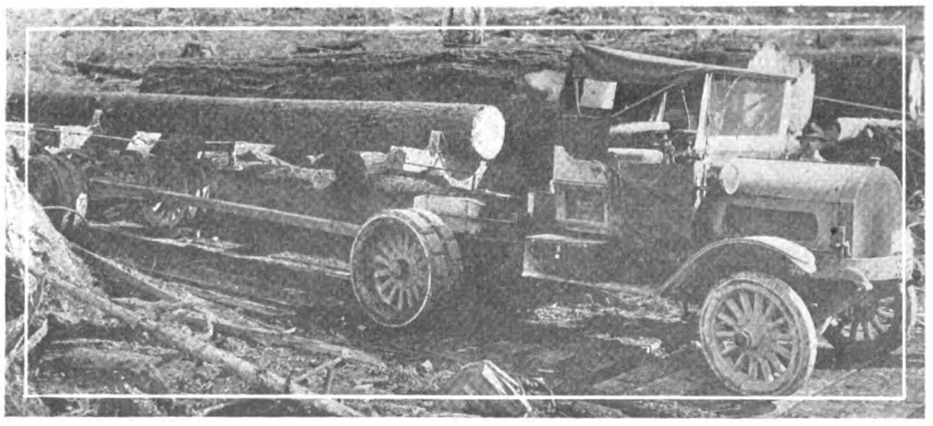
Among the problems in connection with lumber yard delivery trucks are those of size, of load capacity, length of body, facilities for loading and unloading and involved with these comes a question of whether to use a trailer or not.

A study of the trucking needs of the lumber yard shows that there are occasions in which a heavy truck gives the best service, while there are other occasions in which the light truck scores.

Where large quantities and long distances are involved the advantages are distinctly in favor of a heavy truck with a capacity of from 3 to 4 tons, possibly 5 tons. A truck of this capacity could naturally handle quantities more economically than a smaller one and it is likewise more economical in the making of comparatively long hauls where the roads and bridges are suitable for such service. On the other hand there are occasions when action and territory covering is a matter of more importance than quantity. There are jobs of millwork and smaller quantities of building material wanted quickly at many points during the day and in handling trade of this kind the light truck is a natural favorite.

The light truck, say with a capacity of 1 or 2 tons, serves very well in making deliveries on many jobs especially for cottage and ordinary home building where there is much variety of product and not so much quantity. Even the light type of truck will carry more load and cover more territory than the ordinary wagon and team. The different needs, however, furnish problems and sometimes result in more or less of a puzzle to both the truck man and the lumberman who contemplate buying a truck.

In discussing this subject with a number of truck representatives exhibiting at a fair recently the suggestion was made by one of them that where a lumberman is in doubt he might well compromise on a 2-ton truck. To state it another way, he suggested the 2-ton truck as the best all-around truck, where only one is bought. Of course, the right combination, where the service



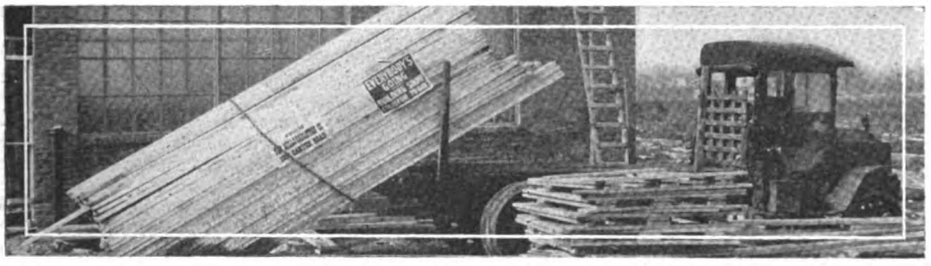
Loading logs on Scearce & Meagher's Mack tractor-trailer back in the woods. The normal load carried by this tractor is 4,000 feet, lumber measure, weighing about 7 lbs. to the foot, or 14 tons average load. About 5,000 ft., or 17½ tons is the maximum load

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justifies two trucks is to have a heavy truck and a light one. Many yard men, however, feel that one truck ought to serve their needs and the problem is to decide what size and what kind.

Another point involved in the selection of trucks for lumber yard service is that of length. The standard length of lumber ranges from 10 to 20 feet. Much of it, especially in framing and boards, runs 16 and 20 feet. The hauling of lengths of this kind call for greater body length in the truck than is usually considered necessary for general trucking purposes. Some truck manufacturers have already taken cognizance of this and have their chassis frames so made that they can move their rear wheels back quite a distance from the ordinary location and thus make the rig more satisfactory for lumber yard service.





Here the efficiency attained at the loading end of the Mills-Carlton Co. is reproduced at the unloading end. Here the truck is at the job, the load being started off the platform by turning one of the rollers. To the left the load is shown after having been rolled back until it tipped, so the truck may run from beneath it

The other problem, one, however, that might be considered an incidental problem of trucking, is that of loading and unloading. When a man has a considerable investment in heavy motor trucks he wants it to be in action and not standing idle for an hour or two at the yard while it is being loaded and again at the job while it is being unloaded. There are two broad lines along which the solution of this problem has been sought. One is that of using trailers and semi-trailers and the other is that of putting rollers in the bed of the truck and using a roller frame or platform on which to pile the load ready for the truck at the yard.

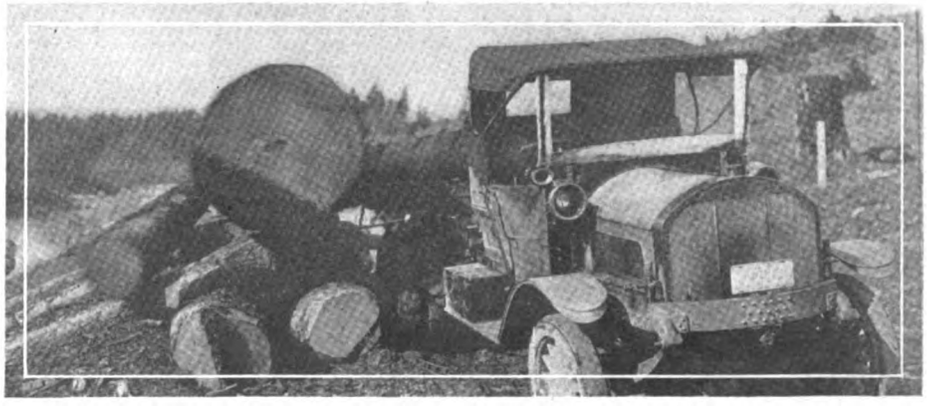
Under this roller dumping system, the load is made ready for the truck on a series of rollers in a frame or platform built the same height of or slightly higher than the truck and in such a position that the truck can be readily backed up to it. Then with a suitable gear varying with different makers the load is rolled onto a truck in a few minutes so the truck can go on its way while another load is being made ready. When the truck gets to the job the action of rolling the load on is reversed and it is rolled off until the back end rests on the ground after which the truck is pulled from under it.

This method is very satisfactory in handling plain boards and rough lumber in large quantities. Where finished molding, casing and base, millwork and such material as cannot be dumped in this way is being handled it is necessary to do one or two things, either take time to load and unload the truck itself or resort to the trailer or semi-trailer system so that the truck may be pulling one while another is being gotten ready. Where it is necessary to load and unload by hand and keep the truck waiting during the process of shifting the load it seems that the odds are in favor of the light truck, a truck that may range anywhere in capacity from 1000 lb. to 2 tons depending somewhat upon the local conditions and surroundings and a little on personal preference.

The present indications are that the final outcome would be the use of both heavy trucks and light trucks by city yards having business enough to justify, the heavy truck for the larger quantities and making deliveries to country points many of which heretofore have been made either by local freight over steam roads or over electric roads. Where the roads are good delivery can be made readily 15 or 20 miles away, in fact one of the great accomplishments of the motor truck is to annihilate distance. Distance is quite a problem with the wagon and team but it is only a small matter with the motor truck provided there are roads and streets over which to make it. After the truck is once loaded and started it eats up miles rapidly and without tiring.

The city yards have already taken up the truck delivery at what might be termed a satisfactory rate. The lumber yards that are looking on speculatively, studying the question seriously and offering a big field for future development are those called country town yards, yards in the smaller cities and towns where there are but few paved streets and where the main hauling is over roadways. A few years ago possibilities of trucking in such surroundings were not at all inviting, but the good roads movement is changing all this and to-day streets and roads in and around the smaller cities and towns have been improved and are being improved at such a rate that it is making a great opening for motor trucks.

In making visits to many lumbermen in such localities in his state the writer found that practically everywhere the lumber yard men are interested in the subject, are eagerly asking questions about it and making a study of motor



At the end of the corduroy road, the tractor dumps its logs into the water which floats them down to the mill. The logs run from 32 to 40 feet in length and from 2½ to 8 feet in diameter at their large ends. A cable sling eases them off

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trucks for handling their delivery work. They examine with interest every proposition that comes along from converting Fords and hooking on trailers and semi-trailers to the little trucks and big trucks offered specifically by truck manufacturers. They one and all say that they know the truck is the coming thing but what they want to know and what they are puzzling about is what make, kind or size they should buy.

Some frankly admit that they want to see the other fellow do the experimenting and benefit from this rather than experiment themselves, but all are interested in the subject and this division of the lumber industry offers at the present writing a splendid field for study and mission work on the part of truck manufacturers who are seeking to enlarge their selling territory.

Get-together Spirit Makes a Success of First Dry Goods Delivery Conclave

Motor Trucks Most Important Topic Discussed by Department Store Heads From All Over Country

NEW YORK CITY, Jan. 10—The first of its kind ever held, the 3-day conference of the delivery heads of dry goods and department stores, which came to a successful close here to-day in the conference room of the *Dry Goods Economist*, 239 West Thirty-ninth Street, was indicative of the great trend of public opinion that industrial preparedness is as vital in times of peace as in war. It was the opening wedge into the great China Wall which has for many years past hedged in many of the country's greatest department stores and prevented other similar concerns from profiting by the experience gained from the use of the latest time- and money-saving equipment both within the stores and without.

Eighty Stores Represented

The conference brought together the representatives of some eighty department and dry goods stores situated in the four corners of our country and even from far-off Canada. Seattle, Wash., in the far northwest; Portland, Me., in the far northeast, and New Orleans, La., in the south were all represented.

Several large department store owners enthused with the great idea of industrial preparedness, not only sent their delivery superintendents, but came themselves to learn first hand how department stores in various parts of the country were solving problems very similar to their own.

This spirit of the free interchange of ideas and the ready reception which it received at the delivery conference should mean much to the department store field during the coming year and thereafter for all time. It is a clear indication that the old order of things is passing away.

It means that the old-fashioned idea of prohibiting your competitor from going through your store, and likewise making it impossible for you to go through his, for fear that he will learn something to later turn against you, is at last being eliminated. Store owners are learning that reciprocal courtesies of this kind and the free interchange of ideas mean as much to one as to the other—that he who gives also receives and that as a result both advance a step in the progressiveness which both must possess if they are to survive.

China Wall Being Broken Down

China's civilization has not progressed to the same degree as that of the western world because China insisted upon shutting herself up within her walls and preventing the entrance of strangers with advanced methods of accomplishing undreamed-of results. Department stores which several years ago erected imaginary China Walls around their delivery equipments and owners who distrusted their competitors have seen the error of their ways as was evidenced by the large representation at the conference.

The Subjects Discussed

It was this spirit of get-together which pervaded the gathering that made it a success. As it was purely a delivery conference, the subjects of the selection, care, operation and maintenance of motor delivery vehicles were the most vital ones discussed.

Among the various phases of motor vehicle delivery work taken up were the following:

"The Internal Delivery Work: Its Equipment and Operation," by H. N. Hirshberg, manager of the Philadelphia branch of the Lamson Co., maker of mechanical interior conveyors and the like.

"Could the Store Make a Charge for All or Any Deliveries?" by Max Morehouse, president of the Morehouse-Martens Co., Columbus, Ohio.

"Delivery Employees, Their Training, Supervision, Promotion, Wages and Bonuses," by W. S. Pendleton, delivery manager of L. Bamberger & Co., Newark, N. J.

"Distributing and Suburban Stations," by J. A. Hanley, delivery superintendent J. L. Hudson Co., Detroit.

"Garages and Garage Systems," by Joseph Husson, associate editor, THE COMMERCIAL VEHICLE.

In the discussion of the internal delivery equipment of dry goods and department stores, Mr. Hirshberg pointed out the close relationship between the efficiency of the interior handling methods and that of the delivery vehicles outside. He discussed the merits of belt conveyors and spiral chutes for various classes of work, and urged the use of spiral chutes rather than elevators for the vertical movement of goods and belt conveyors instead of hand wagons for horizontal transfer as from one portion of the same floor to another.

Extra Delivery Charges Coming

The possibilty of charging customers for the delivery of packages according to the value or the size, as discussed by Mr. Morehouse, was one of the most interesting talks of the entire conference. He pointed out that the cost of delivery has been increasing due to the increased cost of labor and the larger areas now served by motor vehicles. Assuming that the average cost per package delivered was approximately 9 cents, he stated that practically all stores had to deliver a large number of packages at an actual loss.

It was his belief that this condition would have to be overcome either by restricting the practice of delivering small packages which could be carried home

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PROPOSED SCHEDULE OF FEES FOR MOTOR TRUCKS IN NEW YORK STATE TO BECOME EFFECTIVE FEBRUARY 1, 1917.

These fees apply to motor trucks in New York City.

SCHEDULE OF FEES FOR MOTOR VEHICLES USED AS BUSES

Seating Capacity	Yearly Fee or Tax
Five passengers or less	$15.00
Not less than six or more than seven	24.50
Not less than eight or more than ten	30.50
Not less than eleven or more than sixteen	43.00
Not less than seventeen or more than twenty	52.00
Not less than twenty-one or more than twenty-two	55.00
Not less than twenty-three or more than twenty-six	61.50
Not less than twenty-seven or more than thirty	67.50

For each vehicle having a seating capacity of more than thirty, the fee of $67.50 must be paid in addition to a fee of $2 for each passenger seat provided in excess of thirty If a bus is originally registered after August 1 of any year, the fee for that year shall be one-half that provided above.

SCHEDULE OF FEES FOR MOTOR TRUCKS

Combined Weight of Truck, Including Chassis, Body and Capacity Load	Yearly Fee or Tax
Two tons or less	$10.00
More than 2 tons and not more than 3	15.00
More than 3 tons and not more than 4	20.00
More than 4 tons and not more than 5	25.00
More than 5 tons and not more than 6	30.00
More than 6 tons and not more than 7	35.00
More than 7 tons and not more than 8	40.00
More than 8 tons and not more than 9	45.00
More than 9 tons and not more than 10	50.00
More than 10 tons and not more than 11	55.00
More than 11 tons and not more than 12	60.00
More than 12 tons and not more than 13	65.00
More than 13 tons and not more than 14	70.00

Each truck whose total weight is greater than 14 tons as outlined above must pay the fee of $70 plus an additional fee of $10 for each ton in excess of that weight.

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by the purchaser or making a fixed charge for such service based upon the value of the goods so delivered. In this, he was of the opinion that department stores would eventually have to decide between the two methods stated, but that it would probably take 1 or 2 years to accomplish the desired results.

Mr. Pendleton described his method of handling employes by giving each a square deal and rewarding efficient service by suitable bonuses. His method in this work was fully described in the Feb. 15, 1916, issue of THE COMMERCIAL VEHICLE.

The new delivery room of the J. L. Hudson Co., Detroit, located about ¼ mile from the store, was described by Mr. Hanley. This room, located in a brand new building, was made necessary by street congestion in front of the main store. The goods is loaded in trucks and transported in trucks and trailers to the new building, where it is unloaded onto conveyors, from which it is sorted into the route bins in the usual manner.

Mr. Husson first discussed the use of public garages, service stations and privately owned and operated garages and pointed out that dependent upon average conditions, it would be found cheaper for a store to maintain its vehicles in its own garage if its fleet consisted of five or more trucks. He also stated that the use of a service station for maintaining vehicles of one make was far more preferable than a public garage, in that the mechanics in the former are experts on one particular make of vehicle, while in the latter case they might know a little about all types of trucks, but be experts on none. Naturally a crew of expert mechanics for one make of vehicle can do repair work on that make cheaper and in less time than another gang not so expert.

Mr. Husson also stated that no definite rules could be given to cover all public or private garage problems, but that the conditions existent would have to be carefully considered before making a decision. He further went on to discuss the lay-out of garages, elevators *vs.* ramps and showed by means of blackboard sketches how one of the most modern New York City garages had solved the washing problem by the use of a movable washstand.

He also spoke briefly on the subject of garage management, pointing out the necessity of having a real executive in charge of a truck fleet if satisfactory results are to be obtained. He also recommended the use of a cost system for each vehicle in the fleet so that the relative cost of operation of each truck may be gaged to determine the efficiency of the drivers.

Simple Garage Repair Tags

A system of repair tags with the names of the parts of the trucks printed on them and blank spaces for the mark of the driver to indicate what parts needed attention was suggested. These tags were to be as simple as possible and to require no writing on the part of the driver except to mark a cross in front of the part needing repair. Such tags were to be attached to the vehicle and the work checked off by the mechanic as soon as it had been done. The latter was also to sign the card after the completion of the work so that it could be identified at any later date.

A more complete report of the conference will be published in a subsequent issue of this magazine.

New Yorkers Prepare to Launch Vigorous Fight Against Unfair Truck Taxes

New Fees Double to Fourteen Times Present Charges—Schedule Not Based on Extent of Use or Road Wear

NEW YORK CITY, Jan. 13—Vigorous action is being taken against the proposed schedule of fees for motor trucks and buses in New York State as filed with the secretary of state on Dec. 29, 1916, and reported in the Jan. 1, 1917, issue of THE COMMERCIAL VEHICLE. The proposed schedule would increase the motor-truck fees from double to fourteen times the present charges. The tax for a thirty-passenger bus would be $67.50, in addition to the personal or corporation taxes and franchise taxes. The fee for a 7-ton motor truck would be $70 instead of the present charge of $5, as applied to all commercial vehicles.

Counsel Bond of the Motor Truck Club of America is preparing a legal brief to be presented to the legislature and also a form of protest to be used by members of the club in paying the proposed fees. These forms are being mailed out to each of the club members, and will be used by them in paying the fees falling due under the new schedule on Feb. 1.

It is also the intention of the Motor Truck Club to institute a test case in the courts to prove the constitutionality of the procedure of delegating the power of taxation to a commission such as was done in the case of the Motor Truck Fee Commission, which filed the schedule mentioned.

Legislature Will Not Pass on Law

Although Governor Whitman has admitted that it is unconstitutional to so delegate such a power, it is not his intention to have the legislature pass upon the schedule as filed so that it will go into effect on Feb. 1 unless the petition of the Motor Truck Club and legal evidence presented by the National Automobile Chamber of Commerce, the New York Automobile Dealers' Association and the Fifth Avenue Coach Co. are given consideration and changes made.

All commercial vehicles now operated in the State pay a flat yearly fee of $5. Under the proposed schedule, all commercial vehicles having a combined weight of truck and load of 2 tons or less will have to pay $10, or double the present fee. This classification would include all of the 1000-pound delivery vehicles and the ¾-ton trucks. From the minimum fee of $10, the charges increase in $5 increments for increases in weight up to $70 for trucks of combined weight of chassis and load not to exceed 14 tons. Trucks whose total weight is in excess of 14 tons will have to pay $70 plus $10 for each additional ton of weight above that amount. The 14-ton classification would include 7-ton trucks with a chassis weight of approximately 6 tons, a body of 1 ton and a load of 7 tons. This $70 tax is fourteen times the present fee.

Aside from the increased fees for motor trucks engaged in the ordinary pursuits of commerce, the schedule filed would also increase the fees for motor buses, basing the charges solely on seating capacity. A motor bus with a seating capacity of five or less would be charged $15 yearly up to $67.50 for those with seating capacities for between twenty-seven and thirty passengers. Such fees would place a great burden on the buses of the Fifth Avenue Coach Co., New York City, each of which already pays a yearly tax of $791, including State and city registration fees, franchise taxes for the use of the city streets and personal property corporation taxes, as shown below:

Taxes and license fees paid by the Fifth Avenue Coach Co. during the year ended June 30, 1916:

5% of gross passenger receipts.	$75,060.62
License fees	2,620.00
Registration fees	720.00
State franchise tax	285.83
Personal property tax	510.00
Federal tax	4,762.30
State tax on gross receipts	7,436.82
Real estate tax	7,548.00
	$98,943.57
Average number of buses operated	125
Average amount of taxes and income fees paid per bus	$791.55

It is an unfair schedule because it taxes motor trucks as a class and not passenger cars or horse wagons. It is unfair because of the great increase in fees which do not bear proportionately upon all track users. For example, no proof has been shown that a truck weighing 14 tons, including chassis weight and load, does seven times the damage to a road as a truck weighing but 2 tons in all, as the respective fees of $10 and $70 would seem to indicate.

Good Basis for Tax Fight

The schedule is unfair because it classes trucks and their damage to the roads upon weight alone. It is admitted by every one conversant with road construction and wear that the speed of the vehicle, how many wheels the load is supported on and what kind of tires are used are all important factors which must be taken into account with many others before any fair schedule can be determined.

It must be remembered that the commission was formed under an amendment to the Highways Law of New York State, Chapter 598, passed May 19, 1916, in which it was specifically stated that the commission must fix any new schedule of fees as follows, quoting verbatim from the law:

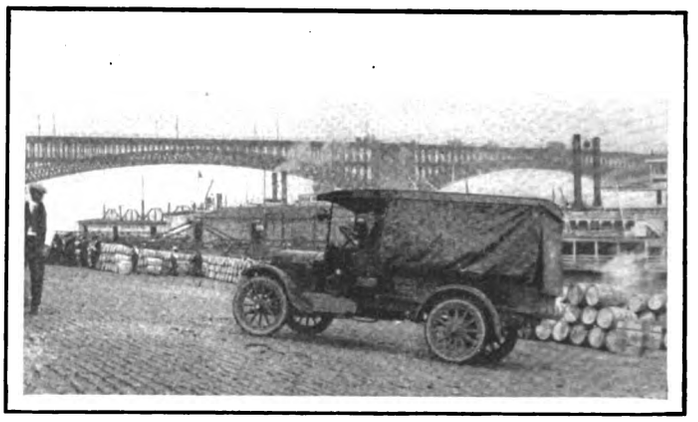
> "And in fixing such fees shall (the commission) classify such motor vehicles upon the basis of the time and extent of their use of the public highways and their relative wear and tear of the public highways by reason of their use thereon."

From the above it is seen that the commission has not fulfilled its duty as laid down in the law for the reason that its schedule of fees is based only upon the seating capacity of buses and the weight of trucks. Neither buses nor trucks are classified according to the time and extent of their use of the roads. Neither are such vehicles classified according to their wear and tear on the roads. For these two reasons it would seem that the schedule as filed is a botch and a compromise which may be attacked with much promise of success.

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Demonstrator Treks Across Ten States on Test

Young Men Pilot Experimental Chassis From Michigan Factory to California By Agency Route



On the levee at St. Louis. A big water connection terminal is a striking revelation of the haulage field open to the motor truck. Everything loaded aboard ship has to be hauled several times

By John Grant

PUSSYFOOTING has no place in the testing of new commercial vehicle models among progressive manufacturers. There are too many excellent vehicles now on the market, and manufacturers who are in the business to stay know that to give a new model its try-out in the hands of users who expect finished vehicles for their money does not pay in the long run. To start a truck across the continent seems to be a heroic sort of test, but is becoming quite popular, since it surely represents about every sort of trial to which a vehicle may be subjected.

Such a test has recently been completed by a Republic Dispatch 1500-pounder fresh from the experimental shops, the run being from Alma, Mich., to Los Angeles, Cal. This was no Lincoln Highway tour—although that would be rigorous enough—but a roundabout zig-zagging from truck center to truck center, with another very practical purpose besides the mechanical testing of the truck, namely, its demonstration to dealers along the way.

The Republic Dispatch completed its journey from the Republic factory at Alma, Mich., to the store of D. F. Poyer, southern California distributor, on Dec. 14. Driven by Lester Poyer, accompanied by H. L. Dewey, it began its journey from Alma to the Coast Oct. 5. After being photographed at Universal City for the Universal moving picture



A proud forty-niner, Mr. Walker, of Carlinville, Ill., who crossed to California in an ox wagon train, taking 6 months for the trip, 67 years ago, lives to grasp the wheel of a transcontinental truck

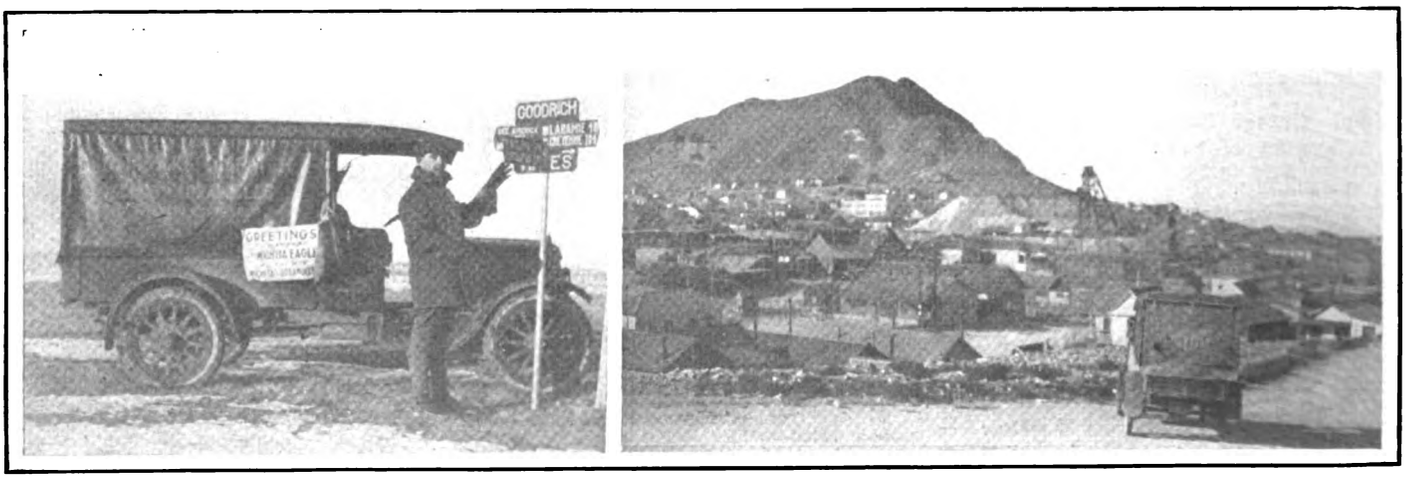
news service, it was driven into Los Angeles in a parade of Republic trucks through the business streets and drawn up to the curb in front of the distributor's as casually as any rancher would stop after a trip in from a suburban point. And its condition gave no evidence of the miles of mud and rocks and snow negotiated weeks after the normal season for closing transcontinental tours, when every Western motorist shuns the snow-swept and rain-washed passes of the high Rockies and Sierras.

The route of the Republic Dispatch passed through Grand Rapids, Mich.; Chicago and Springfield, Ill.; St. Louis, Mo.; Davenport, Des Moines, Omaha, St. Joseph and Kansas City, Mo.; Topeka and Wichita, Kan.; Denver, Colo.; Salt Lake City, Utah; Ely, Nev.; Mojave, Bakersfield, north to Fresno and south to Los Angeles, Cal., a total of 4,080 miles.

Unfavorable conditions encountered were wet clay and gumbo, snow, deep fords of mountain streams, mountain passes, with their grades, narrow, dangerous roads, and the sand and volcanic rock-covered roads of the desert. Bringing through a pair of pneumatic tires under such a load is almost a miracle.

The Republic Dispatch is the new model 9, 1500 lb. maximum capacity. This truck was equipped with Goodrich 32 by 4 pneumatic non-skid tires all around and Master carbureter. Its load, body, camping equipment, etc., and crew of two men, including weight of the body, totaled 3900 lb.

Road conditions encountered *en route* were carefully logged by the crew. Very heavy clay was the first obstacle between Peoria and Springfield, Ill. With four chains and mudhooks the truck skidded all over the road traveling at night.



Left—Posted highways are a godsend in the blizzard swept prairie of Wyoming. Right—Approaching the mining town of Tonopah, Nevada

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After passing St. Charles, Mo., rain made the roads along the Mississippi River to Hannibal, characterized by heavy grades and clay, so heavy with mud that 90 to 150 miles a day was all the crew cared to drive. But the truck kept at it as long as they stayed at the wheel. From Hannibal through Quincy and Keokuk, Ill., wet, soggy gumbo that rolled up and caked on the wheels not only continued, but got worse and worse. At one time there was four inches of snow on top of the gumbo, and the truck went through snow, frozen crust and clay beneath.

At Burlington it was reported that the road to Davenport, 55 miles, was impassable on account of 2 days' heavy rain and snow, and the truck was shipped by train from Burlington to Davenport. Coming from Grand Rapids to Chicago the truck had been driven to Muskegon and shipped to Chicago by boat to save 2 days' time through territory where there were no dealers and little interest in trucks. With these exceptions Poyer states that the entire distance was made by the Republic under its own power, and that the two shipments were not made for any trouble in the truck but solely for the reasons here stated.

Leaving Davenport at 8 o'clock at night in a rain the truck covered the rest of Iowa to Des Moines in mud that usually dragged the axles. Sixty to 70 miles was a good day's run. The spokes were invisible, deeply covered with caked clay. From Des Moines to Omaha mostly fair weather and better roads relieved the strain on the drivers. At Omaha the travelers gladly left the Lincoln Highway and found fair surfaces all the way to Kansas City. Dealers in this section are doing an active business, and have big, finely-equipped garages, blacksmith, carpenter and paint shops that back up sales with splendid service.

Topeka was reached over roads from Kansas City that were a little rough, but dry, and were good to Wichita, whence the truck went on the Santa Fe trail near Emporia. Good roads made a



Wyoming demands a truck that will keep going. The snowy prairies would be traveled for hours at a time without sighting a house, man or vehicle. In the high mountains of Wyoming and Utah huge snow drifts made a shovel a necessary part of the equipment. Wallowing through axle deep was an everyday affair in this stage of the journey

cheerful proposition of covering 250 miles in a day of 8 or 10 hours as far as Pueblo, Col. The trip north on the splendid Colorado State highway, 117 miles to Denver, was made in 5½ hours.

"From Denver on the roads were a fright," is Dewey's terse summing up. They hit the Rockies 40 miles out, at Ft. Collins. Here they toiled up through a succession of passes, surface of slippery clay, with snow and drifts that made heavy labor with the shovel. One little town was nearly buried in the huge drifts. Going down grade to Laramie conditions eased up a little, but the deepest snow of the trip was cut through between Laramie and Mecidine Bow. It came up to the armpits of the drivers in the drifts.

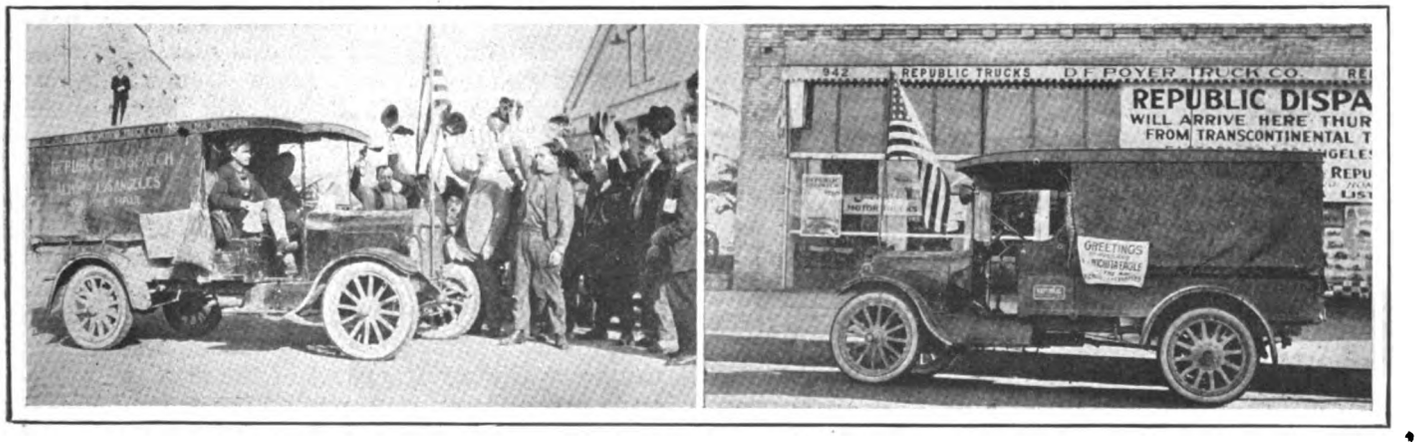
The Republic Dispatch left Medicine Bow in a blizzard, and broke road for 250 miles. The Lincoln Highway here is just a trail. A car goes through and in five minutes its track is lost in the drifting snow, with no trace of a road in sight. Through Rawlins the snow held, and into Rock Springs, a region of mountain passes up to 7000 ft. altitude. Sixteen miles out of Rock Springs something went wrong with the clutch—the first trouble of the trip. It was also the only one. The drivers spent the evening from 7 to 12:30 walking back to Rock Springs. The next morning they paid a Rock Springs garageman his price of $15 to tow the car in the 16 miles. The repair took one day—10 hours machine work at $1 an hour. Then they went on, the slight defect in the casting repaired.

They made from Granger to Salt Lake City, 152 miles, in one day, passing old Ft. Bridger, the famous Indian trading post, then down through three bad canyons, Silver Creek, Echo and Parley's, to Salt Lake City.

The last pass was a Jonah, towering up to 8500 ft., with rough, stony roads, very sharp turns and steep pitches. Going down the drivers used compression and both brakes, and wore out both brakes in these three canyons. The last coast, a typical Western mountain grade, wound down 15 miles to Salt Lake City, the lights of which showed ahead, cheering them as they rounded turn after turn down the canyon.

Lincoln Highway was again resumed out of Salt Lake City, and Thanksgiving

(*Continued on page* 53)



Left—Arrival of the truck at Universal City. Right—The end of the journey, drawn up in front of D. F. Poyer's place of business in Los Angeles

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The Show Spirit Survives

MOTOR truck shows on a national scale have not been revived in spite of much favorable sentiment. The great national exhibition which has just closed its doors at the Grand Central Palace in New York was without trucks. But the show spirit still lives. The truck business is no longer a poor relation of the passenger car industry. It is a competent and independent entity and is growing faster than the passenger car business.

That the show spirit is not dead is indicated at New York by the number of truck manufacturers who have taken highly expensive space at the New York hotels to attract the visiting dealers to their products. Such space costs considerably more than the far preferable space that would be provided in a truck show or field day or demonstration or contest or national exhibit of any kind; but it pays.

It has been said that shows only benefit the new concerns or the freak concerns and that where shows are held the more conservative makers are obliged to exhibit in order to hold their own against competition. Yet, with this necessity removed we find about half of those who have gone to the expense of staging private shows in the most public places available are conservative manufacturers of years' standing whose products show no changes. One of these is a pioneer builder whose design has stood unchanged in essentials probably as long as any truck now marketed.

Furthermore, even those makers who are committed to a policy of conservatism occasionally bring out new models. There is nothing less stable than dealer representation as it exists today and if a manufacturer is to keep up with his competitors, he must keep in touch with progressive vehicle merchants, whether he has anything new in his truck, or merely some old but very good things which perhaps everyone does not know about.

At Boston the annual show at the Mechanic's Building has been found too small for the car exhibits and all of the trucks that dealers and manufacturers want to show. There has been serious talk of a separate show to be held simultaneously.

In Brooklyn, the applications for truck space so crowded the cars that it has practically been decided to hold a separate show for the trucks. That it is to occur a week or so later is a mistake, it is to be feared.

Newark is to segregate trucks this year, for the first time, in an annex of the armory where the exhibition is held. So it is all over the country. The show spirit still lives.

Time Payments Accelerate Sales

THAT nearly 95 per cent of commercial vehicles are sold on a time-payment basis and that this method of sales has increased heavily in the last year, accounts to quite an extent for the largely increased sales of commercial vehicles in the last 12 months. It is a good indication of the broadening of truck merchandising that manufacturers and dealers recognize the good business of selling trucks on a basis similar to that on which other lines of merchandise are handled. The investment of a firm making a truck installation is necessarily heavy, involving more capital than many firms care to take out of the business, and meeting the business man on this common platform has played a large part in the greatly increased sales of the year. In a word, the installment plan as generally practised has amounted to meeting the business man on his business platform, rather than following the almost impossible plan of pioneering on a new financial standard. Pioneering alone is ultra-expensive and when you endeavor to place it on a different merchandising standard you are only adding to the obstacles you have to overcome.

Time payments were ridiculed by not a few makers a few years ago, and the firm that extended time and held it out as a sales inducement was criticized. Fortunately for the industry, conditions have changed and sound business has had its hearing. The many alleged ills of time payments have been conspicuous by their absence. There have been astonishingly few cases of the purchaser failing to meet his notes, throwing the truck back on the dealer. No better criterion of the soundness of time payment merchandising could be asked for.

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Truck Exhibits Fill Hotel Parlors

Adapters Throng Show—Many Curbside Exhibits

NEW YORK CITY, Jan. 13—Although no trucks are admitted to the exhibits at the New York motor vehicle show, truck exhibits are to be found all over the city. Four years ago it was decided that motor truck shows did not pay and so they were discontinued. Nevertheless a number of motor truck manufacturers and makers of converters have rented expensive quarters in the hotels and in vacant stores.

In the show proper a number of exhibitors, such as the Smith Form-A-Truck Co., are to be found.

The Hurlburt Motor Truck Co., of this city, has rented quarters in the Biltmore Hotel, where its 3½- and 5-ton chassis are on view. The Fulton Motor Truck Co., Farmingdale, N. Y., has its new 1½-tonner in one of the parlors of the Waldorf-Astoria The Maxwell company is showing its new 1-tonner at the Biltmore. The Autocar has space at the Martinique. The Hudford has rented space in the Long Beach building, on Lexington Avenue, across the street from the Grand Central Palace. In the street outside the building shivering salesmen bid for the attention of passers-by to various makes of adapters attached to Fords, and to the Rush, Koehler and Vim light trucks.

TRUCKS AT COLUMBUS SHOW

COLUMBUS, OHIO, Jan 4—Motor trucks will be prominent in the annual Columbus Automobile Show to be held at Memorial Hall Jan. 27 to Feb. 2. Drawings for space were made recently, which developed the fact that more than a half dozen makes of trucks will be exhibited. The show is given under the auspices of the Columbus Automobile Show Co., composed of prominent car and truck dealers.

NEWARK TO SHOW TRUCKS

NEWARK, N. J., Jan. 6—Motor trucks and commercial delivery vehicles will occupy a large section of Newark's annual motor show, which will be held in the First Regiment Armory Feb. 17 to 24. The south and west ends of the main floor of the big drill shed will be given over to the truck section, and the display will be a representative one. Manager Claude E. Holgate has the entries of a dozen trucks already.

Outside dealers as well as Newark motor truck firms are permitted to enter the show. The final day for space applications is Jan. 25, at the show offices, 520 Broad Street.

LOS ANGELES JITNEYS SURVIVE

LOS ANGELES, CAL., Jan. 2—A traffic check on the jitney bus business in Los Angeles made Nov. 15 showed that the motor car for carrying passengers has maintained a hold on the main traffic avenues of the city. The jitney bus had its origin in Los Angeles July 1, 1914. On Nov. 15, 1916, there were in operation 390 jitneys, which carried 36,066 passengers, made an average of 10.63 round trips and average mileage 108.89 miles. Earnings were figured out to an average of $.05095 per car-mile. A comparative check with street cars at Ninth and Main Streets, covering the main north and south line, showed that jitney buses carried 54.65 per cent of the total passengers carried by jitneys and street cars.

Springfield Motors Acquires Knox

To Build Aviation Engines, Tractors and Adapter

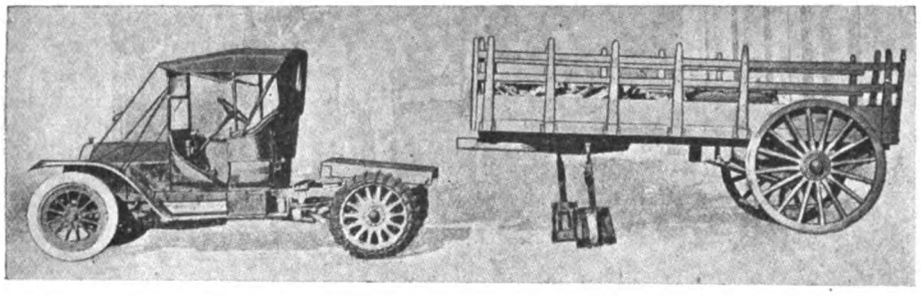
NEW YORK CITY, Jan. 8—Frank H. Trego's large V-type aviation engines will be built by the Springfield Motors Co., just organized under the laws of Delaware with a capitalization of $5,000,000, composed of 500,000 shares of common, par value $10 each. The company has been organized for the purpose also of building commercial, marine and aeroplane engines, and has contracted for the purchase of the Knox Motors Co. plant in Springfield, Mass., together with equipment, patents, etc., including the Knox 300 hp. aeroplane motor recently designed by Mr. Trego, and one of the largest engines ever built in this country.

The manufacture of the Knox tractor will be carried on, at present, in a portion of the factory and later in a nearby location.

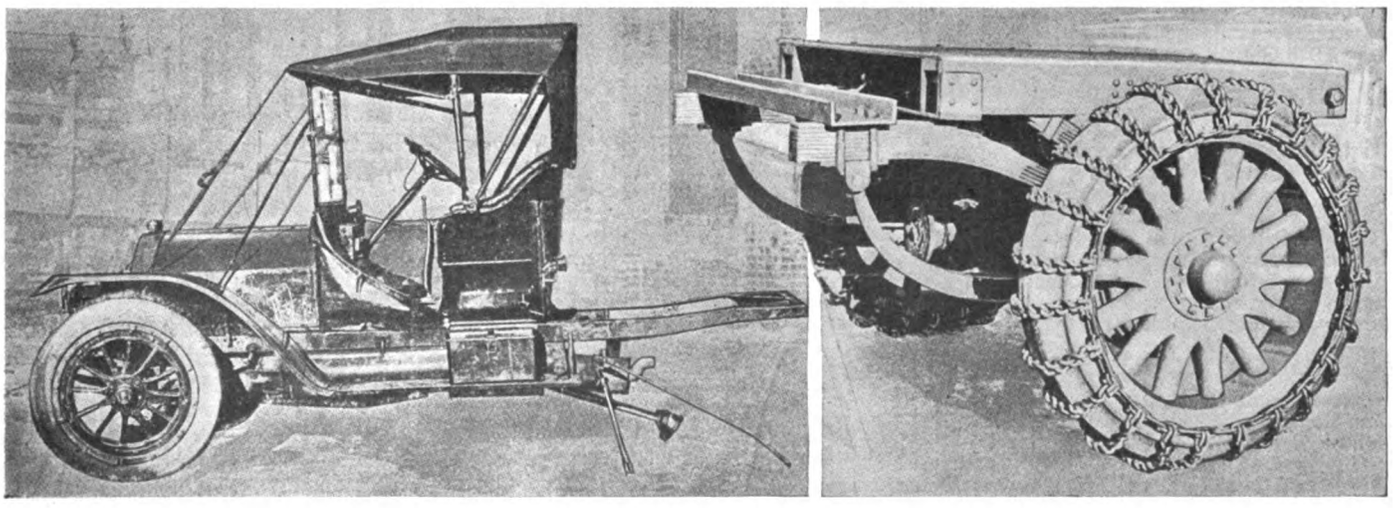
The Knox Motor Associates have developed, in addition to the 10-ton tractor, a unit that may be used with either a new or used touring car and form a tractor capable of hauling 2 to 3 tons. This unit, which sells for $550, is composed of an internal-gear-driven rear axle, the trailer platform and necessary connections, and takes the place of the rear axle and tonneau of the touring car.

H. G. Fisk, treasurer of the Fisk Rubber Co., has become president of the Springfield Motors Co.; E. C. Morse, vice-president and general manager of the Chalmers Motor Co., is vice-president; F. H. Trego is vice-president and in charge of works, and Gerard Roberts, attorney at law in this city, is secretary-treasurer.

The directors consist of H. G. Fisk, E. C. Morse, F. H. Trego, Gerard Roberts, E. S. Kelly, formerly chairman of the board of directors of the Kelly-Springfield Tire Co.; Robert Boettger, secretary of the Selas Co., a director of the Silk Finishing Co. of America and president of the Yonkers Trust Co., and J. J. Cone, vice-president of Robert W. Hunt & Co., engineers.



Knox touring car with Springfield truck converter about to hitch on a wagon



Details of changes in touring car and of construction of Knox truck adapter, incorporating the Martin inventions

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Gramm-Bernstein To Boost Output

1916 Business 22% Ahead of 1915—New Buildings

LIMA, OHIO, Jan. 8—An increase in business 226 per cent ahead of the year before is reported by the Gramm-Bernstein Motor Truck Co. of this city as the showing for 1916, this business being entirely for domestic consumption. The plant has been enlarged and improved by the construction of new buildings and the installation of improved equipment. A new administration building is planned for the coming spring.

The Gramm-Bernstein Motor Truck Co. is a reorganization of the Gramm-Bernstein Co. At the time of the reorganization the capital was increased from $500,000 to $4,000,000.

1916 BANNER I. M. C. YEAR

NEW YORK CITY, Jan. 2—The best year in its history has just been passed by the International Motor Co., the maker of Mack and Saurer trucks, domestic business alone having increased 132 per cent over 1915. For example, in December the New York sales department sold fifty trucks, Boston forty-seven, Philadelphia twenty-two, Baltimore sixteen and Newark fifteen.

BUILT 3500 1916 GARFORDS

LIMA, OHIO, Jan. 9—The Garford Motor Truck Co., this city, produced over 3500 trucks in 1916, valued at more than $5,000,000.

TO INCREASE JEFFERY OUTPUT

KENOSHA, WIS., Jan. 5—Production of Jeffery Quad trucks is to be increased considerably, according to advices from the Nash Motor Co. factory. The records made in service have increased the demand greatly. An investigation shows more than 4000 in use daily in fifty-five lines of trade and in twenty-three different countries.

SCHACHT CAPITAL BOOSTED

CINCINNATI, OHIO, Jan. 4—Papers have been filed with the secretary of state increasing the authorized capital of the G. A. Schacht Motor Truck Co. from $35,000 to $100,000.

LARGER AND SMALLER FEDERALS

DETROIT, Jan. 8—The Federal Motor Truck Co. shortly will begin the manufacture of two new trucks of 1-ton and 5-ton proportions. Mechanically, they will be somewhat similar to the present 3½-ton truck which the company has been manufacturing for the last 3 years, and the 5-ton model will include the worm-driven rear axle, heavy motor with a five-bearing crankshaft.

LARRABEE EXPANDING

NEW YORK CITY, Jan. 2—New blood has been injected into the Larrabee-Deyo Motor Truck Co., Binghamton, N. Y., in the person of Thomas B. Crary, who has purchased a substantial interest in the concern, and at the annual meeting held on Dec. 30 was elected president. The new plant, with greater capacity, has been leased from the Deyo-Macy Engine Co., which is moving to Toronto, Canada. The concern was formerly the Sturdevant-Larrabee Co.

At this meeting besides Mr. Crary, R. H. Deyo was elected vice-president and general manager; F. T. Macy, treasurer and assistant manager, and I. P. Deyo, secretary, and directors as follows: T. B. Crary, H. H. Deyo, F. T. Macy, A. J. Carsons, A. C. Crossly, H. C. Larrabee, I. T. Deyo.

START MARION TRUCK CORP.

MARION, IND., Dec. 30—The Marion Truck Corp., with headquarters in this city, has been incorporated, with a capitalization of $1,000,000, to manufacture motor vehicles. The directors of the company are: C. G. Barley, J. W. Stephenson, S. W. Winder and G. C. Harwood.

PULLMAN IN RECEIVERSHIP

YORK, PA., Jan. 5—A temporary receivership has been appointed for the Pullman Motor Car Co., and the affairs of the concern are now being looked after by W. A. Keyworth, Henry D. Schmidt and Carlton L. Hoff. Officials of the company claim that the receivership was made necessary because of the heavy purchase of raw material in anticipation of future requirements.

The bill of complaint filed by the plaintiffs, John C. Schmidt, George Schmidt and Carlton L. Hoff, sets forth, among other things, that the capital stock of the company is $500,000; that in 1916 it did a business of $3,343,000; that the amount of indebtedness is $557,163.54, and the assets $989,357.85; that the company is solvent and has assets largely in excess of its liabilities.

The object sought by the receivership proceedings, officials of the Pullman company claim, is the rehabilitation and further development of the plant.

Coming Commercial Vehicle Events

Jan. 13-20	Montreal, Que., Can., Montreal Motor Show.
Jan. 16	Newark, N. J., Monthly Meeting of the Motor Truck Club of New Jersey, New Jersey Automobile Club, 22 Washington Place.
Jan. 16	Philadelphia, Pa., Monthly Meeting, Pennsylvania Section, S. A. E.
Jan. 17	New York City, Monthly Meeting of the Motor Truck Club of America, Automobile Club of America, 247 West Fifty-fourth Street.
Jan. 17	Philadelphia, Pa., Monthly Meeting, Motor Truck Assn. of Philadelphia, Hotel Adelphia.
Jan. 24	New York City, Special Meeting, Citizens' Street Traffic Committee of Greater New York, Automobile Club of America.
Jan. 27-Feb. 2	Columbus, Ohio, Motor Vehicle Show.
Jan. 27-Feb. 3	Portland, Ore., Motor Vehicle Show, Dealers' Motor Car Assn., Armory.
Feb. 17-24	Newark, N. J., Passenger Car and Motor Truck Show, First Regiment Armory.
Feb. 3-10	Minneapolis, Minn., Tenth Annual Motor Show.
March 3-10	Boston, Mass., Fifteenth Annual Motor Vehicle Show, Mechanics' Building.

Now it's Day-Elder Corporation

Hexter Joins Newark Concern —Capital Increased

NEWARK, N. J., Jan. 9—The Day-Elder Motors Co., this city, has sold and assigned all of its rights and assets to the Day-Elder Motors Corp. of New Jersey, formed with a capital of $1,000,000, consisting of $500,000 preferred and $500,000 common stock.

P. K. Hexter, who has been for the past 2 years Eastern sales manager of the Republic Motor Truck Co., Alma, Mich., has taken a substantial interest in this company, and has become a vice-president, director and sales manager. Mr. Hexter is located at 1457 Broadway, New York, the general sales offices.

ATLAS MAKER REORGANIZES

YORK, PA., Jan. 4—The Martin Truck & Body Corp., this city, has been formed to take over the Martin Carriage Works, which has been in existence for 30 years, and building commercial vehicles and bodies for the last 10 years. The Martin company formerly made the Martin chain-driven truck. Last year it brought out the Atlas 1000-lb. truck.

The new company is capitalized at $300,000 7 per cent cumulative preferred stock and 30,000 shares of common of no par value. The company is controlled by a syndicate of New York and York interests who purchased the carriage works and incorporated the new company in New York. The company has no liabilities aside from its capitalization, and the assets are said to equal 100 per cent on the preferred with $450,000 remaining for 30,000 shares of common stock.

CLYDE NOW THE FULTON

NEW YORK, Jan. 10—The Clyde Motor Truck Co., this city, has changed its name to the Fulton Motor Truck Co. and is exhibiting the Fulton truck at the Waldorf-Astoria. William Melhuish, sales manager, is in charge.

CHAMPION OFFICE IN CLEVELAND

CLEVELAND, O., Jan. 6—The Champion Motors Co., Fulton, Ill., has moved its main office from the factory at Fulton to Cleveland. It is expected in the not distant future to establish an assembling plant in Cleveland, so that the parts will be shipped to the Cleveland plant and complete chassis will be shipped from the Sixth City.

CROWTHER PRODUCTION TO BEGIN

ROCHESTER, N. Y., Jan. 5—The Crowther-Duryea Motor Co., this city, is about to begin the manufacturing of its roller-driven vehicles. One hundred chassis, it is stated, are being assembled at the present time at the factory in Ridgeway Avenue.

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Continental Motors Reorganizing

Jump in Capital to Double Production This Year

DETROIT, Jan. 6—The Continental Motor Mfg. Co. will be succeeded by a new company capitalized at $18,500,000, which will take over the entire assets, business and goodwill of the present company. The new company will be styled Continental Motors Corp., and will have practically the same board of directors with the addition of two new members. The control and management of the company will remain in the same hands. The increase in working capital will permit the production to be doubled by the end of the year. Rapid progress is being made with extensions to the factories.

HARVEY PRICES JUMP

HARVEY, ILL., Jan. 9—The Harvey Motor Truck Co., formerly known as the Harvey Motor Truck Works, has been incorporated for $300,000 and announces new prices for its product as follows: 2½-ton, $2,500; 3½-ton, $3,250; 5-ton, $4,000. The 2½-ton chassis takes the place of the former 2-ton truck. Officers of the company are: William E. Dee, president; Simon R. Dee, vice-president and treasurer; Bert B. Fornaciari, secretary and general manager.

BARNEY OLDFIELD TO MANUFACTURE

NEW YORK CITY, Jan. 6—Barney Oldfield, it is reported here, has organized the Oldfield Motors Corp. at Los Angeles, Cal., to build cars and trucks.

NEW FORD ADAPTER

DETROIT, Jan. 8—After 18 months of exhaustive experiments, the Selden Mfg. Co. has begun an active, countrywide campaign to introduce the Samson load carrying unit. Its function is to relieve the Ford rear axle of all weight from load when the chassis is converted into a light truck, and to supply a brace to the Ford spring hangers and wheels. This is accomplished by two strong brackets with their auxiliary springs, and two special ball bearings which assemble on the axle housing.

L. A. TRAILER MARTIN LICENSED

LOS ANGELES, CAL., Jan. 2—The Los Angeles Trailer Co. has taken out a license under which it will construct semi-trailers equipped with the Martin rocking fifth wheel device.

GRAVITY DUMP BODY READY

DETROIT, Jan. 4—Gravity dump bodies for motor trucks are now being delivered by a new concern, organized last August and only recently in active swing. This is the Gravity Dump Body Co., of this city. The bodies are of the hopper type and dump by rolling to the side. They are made in various sizes from 1 ton capacity upward.

R. J. Morrison is president; James G. Winsor, vice-president and general manager; A. R. Miller, sales manager, and E. T. Jean, secretary. The concern is located at 113 First Street.

GUARANTY TERMS EASIER

NEW YORK CITY, Jan. 6—Easier terms for the purchase of motor trucks under the credit plan of the Guaranty Securities Corp. Purchasers may now secure vehicles under this scheme on a down payment of 33 1/3 per cent in cases where formerly 50 per cent down was demanded.

DEFICIENCY IN TRUCK APPROPRIATION

WASHINGTON, D. C., Dec. 30—Reports from the War Department show that about $34,500,000 has been spent in the purchase and operation of army motor trucks this year. The last army bill appropriated $23,000,000 for the present fiscal year, and an estimate of a deficiency appropriation of $11,415,770 has been submitted.

Many of these trucks were in use on the Mexican border. Some of them now are stored at Fort Sam Houston, Fort Bliss and El Paso, Tex., where they are available for future use. About 2300 trucks were bought for use on the border and in Mexico.

ANOTHER ARMY GARAGE

BROWNSVILLE, TEX., Jan. 5—In addition to the two large motor truck garages and repair shops which are to be built by the government for army use at Fort Bliss and Fort Sam Houston, announcement is made of the adoption of plans for the erection of a similar structure here. The quartermasters' department at Fort Sam Houston has leased two blocks of ground here which will be the site for the proposed buildings. The main building, which will be occupied as a garage for army motor trucks, will be 320 by 160 ft. A similar building will be erected in which complete equipment of machinery and other essentials will be installed. The buildings are to be of a permanent type of construction, which is taken to mean that the use of motor trucks in military service and operations upon the lower border will continue for an indefinite period.

FREIGHT LINES IN TEXAS

SAN ANGELO, TEX., Jan. 5—Motor truck lines for the transportation of all kinds of freight between the more remote points of western Texas, where railroads are few, are now in regular service. The longest is between San Angelo and Sonora, 72 miles. The use of motor trucks on the ranches of western Texas is becoming quite general. Many of the larger landed properties which are 20 to 50 miles from the railroad find that the transporting of cotton seed cake and other feed stuff for their cattle can be done more economically by trucks than by animal-drawn wagons. Some of the more remotely located farmers also are using motor trucks for hauling their grain, hogs and other products to the shipping point and taking back supplies.

Truck Represented at S. A. E. Meeting

Tire Loads, Battery Jars and War Specifications Vised

NEW YORK CITY, Jan. 12—At 3:15 this morning the annual winter meeting of the Society of Automobile Engineers came to a termination with the departure of the last of the members from the Ziegfeld Midnight Frolic performance, which followed the annual banquet.

Steps toward the change of name from the Society of Automobile Engineers to the Society of Automotive Engineers was the most significant act in an eventful 3 days. This move was made for the purpose of co-ordinating standardization of all industries related to the motor vehicle industry by virtue of their powerplant equipment. The society now embraces the interests of the motor car, motor truck, airplane, motor marine and agricultural tractor industries. It is only natural that with such a diversity of interests the motor truck should consume only a small part of the attention of the busy delegates.

It was at the standards meeting, on Wednesday morning, that truck subjects received attention. The long and difficult task of standardizing tire load ratings as a complement to the standardization of rim sizes was brought nearly to a completion by the tire and rim division when it recommended for adoption the following standard table of solid rubber tire carrying capacities.

Width in Inches	Gross Load per Wheel in Pounds — Tire Diameter Under 40 In.	Tire Diameter 40 In. and Over
3	1,000	....
3½	1,300	....
4	1,700	....
5	2,500	2,600
6	3,300	3,500
7	4200	4,500

This proposed schedule of load capacities resulted from years of study and much earnest discussion. It represents higher load ratings than those customarily issued by the tire manufacturers. The basis for the schedule was more that of practical experience than any attempt to average present practice and the recommendations were not made without serious opposition from certain quarters.

It is understood that the width measurement is to be considered the base width, as is customary, and dual tires are assumed to have double the capacity of singles. The schedule does not go above 7 inches, because there is practically but one maker of tires of greater width than this, nor does it attempt to allow for different depths of tires.

Assistance to the government in drawing up reasonable specifications for army trucks is being undertaken by the truck standards committee, and A. L. Riker, as a member of the committee in the place of Chairman Church, who was absent, explained that the government had requested the assistance of the society in drawing up new specifications for

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army trucks, as it was for this reason that the committee has been formed. He stated that the committee was working in co-operation with the motor transportation board of the government and that good progress toward a specification, satisfactory alike to the government and the industry, was in process of preparation.

Another matter which was of particular interest to the electric branch of the commercial vehicle industry was a recommendation submitted by the Electric Vehicle Division on standard dimensions of storage battery jars and standard assemblies for storage batteries. The total number of sizes embraced by these recommendations constitute about one-fourth of the number of sizes now in general use.

RIKER AND CHURCH ON U. S. TRUCK BOARD

NEW YORK, Jan. 3—At the request of Colonel Baker, President Russel Huff, of the S. A. E., has appointed A. L. Riker, member of the Naval Consulting Board and chief engineer of the Locomobile Co.; H. D. Church, chief engineer Packard truck department, and the chairman of the standards committee, to serve on the army board that is engaged in preparing truck specifications.

GOTHAM SNOW-REMOVAL CONFERENCE ON JAN. 24

NEW YORK CITY, Jan 12—Co-operation on snow removal will be discussed at the next meeting of the Citizens Street Traffic Committee of Greater New York, to be held at the Automobile Club of America on Wednesday evening, Jan. 24, 1917, at 8 p. m. As pointed out in the Dec. 15, 1916, issue of THE COMMERCIAL VEHICLE, the time is near in twenty-five of our largest cities when it may become necessary to mobilize privately owned motor trucks and horse wagons to remove snow from the city streets.

Heretofore a snowstorm of more than a day's duration has practically paralyzed the vehicular transportation in such centers. This has caused millions of dollars' loss daily. It has been due to the lack of an efficient, planned-in-advance organization to remove the snow rapidly.

A discussion of the methods of mobilizing privately owned vehicles in this city or of the complete motorization of all of the city's snow-fighting equipment will be undertaken at the meeting which should bring out the ideas of many able men well acquainted with the subject. Among those to address the gathering will be Street Cleaning Commissioner John T. Fetherston, G. A. Green, chief engineer of the Fifth Avenue Coach Co., whose excellent snow-removal organization was described in the Dec. 15, 1916, issue of THE COMMERCIAL VEHICLE, and Joseph K. Orr, president of the New York Team Owners' Association.

Besides the question of efficient snow removal, short addresses will be made on the subject of "Centralizing of Power for Granting of Permission for Street Openings." Those expected to speak on the topic include George W. Tillson, Prof. A. T. Blanchard, Consulting Highway Engineer to the city of New York, and Mr. Dunn.

Kelly Gets 100-Truck Circus Order

3½-Ton Fleet to Form World's First Truck Show

NEW YORK CITY, Jan. 12—The first motor-truck circus in the world came into being to-day when the United States Circus Corp. of this city purchased 100 3½-ton trucks from the Kelly-Springfield Motor Truck Co., Springfield, Ohio. The vehicles will form the nucleus for the show company's unique motor-train circus which will travel from city to city over the highways exclusively by truck, doing away with the immense amount of labor incident to loading and unloading from railroad trains and the delays always met with when that method of transportation must be adhered to.

The trucks will be delivered immediately and the show will start out on its first trip in May, 1917. The order was closed to-day at the office of the United States Circus Corp., by Frank P. Spellman, president of the concern, and James L. Geddes, president of the Kelly-Springfield Company.

The entire truck fleet, which will consist of more vehicles than the number purchased to-day, will be divided into two parts, a parade unit containing the floats and cage vehicles and a utility section comprising trucks with Pullman type bodies for the officers, performers and workmen of the show and others carrying the tents and equipment. Both sections will form a complete self-sustaining train in which the personnel will both sleep and eat either *en route* or at the stopping points along the way.

The great possibilities of the motor-truck circus were predicted more than half a decade ago by no less important a personage in the show world than William F. Cody, better known as Buffalo Bill. These possibilities become manifest when it is considered that the outfit will be entirely independent of the railroads, and will therefore be able to reach a greatly larger territory than can be covered by rail means.

In fact, the use of motor trucks will increase the field of the circus more than 100 per cent. At the present time there are 2182 towns and cities of sufficient size to warrant circus stops of one or more days. Yet of this number only 968 are now played to, leaving 1214 towns which cannot be reached simply because they have no suitable railway connections. The use of motor trucks will enable this large number of towns to be reached, and in the least possible time because many of them are on direct routes between cities by road but not by railroad.

Circus transportation by rail is also excessively costly because the trains must run as specials and tend to disrupt ordinary railway schedules. Besides, railroad congestion is one of the circus' chief problems and one in which the delays incident to such congestion are decidedly expensive to the circus when its opening date in any town must be postponed.

All this will be done away with by the motor-truck train. It will also eliminate the costly railroad equipment and the vehicular accessories necessary to transport the show from the point of rail unloading to the point at which it will be set up, and to carry it back again to the rail line for transshipment to the next stopping point. It will also save the waste time now consumed in such unloading operations and haulage and will enable a much longer route to be covered in the same time and with less manual help because all the trucks will have to do is to run to the fair grounds or other fields and have the tents and equipment set up on the spot.

The use of the trucks will also eliminate many of the expensive six-horse teams now employed to haul the outfit between the railroads and the set-up points. Each of these six-horse outfits costs about the same as a motor truck, but has a great deal larger maintenance charge. The horses will cost $3,000; the wagon and body $3,000, and the harness $1,000, making $7,000 in all. Allowing $4,000 for the cost of the truck and $3,000 for the body it is seen that the cost is about the same. The horse outfit will cost about $2,100 a year to maintain, a large percentage of which is unproductive winter upkeep, while the charge of truck maintenance will be much less.

Aside from these savings, the motor-truck train will have a great advertising value by moving over the roads and through towns to points beyond at which shows will be given. It is quite probable that the rural population in the territory through which the train passes will flock to the stopping points in their passenger cars, being acquainted of the next stop by signs carried on the sides of each vehicle. This advertising is entirely lost when the rail transportation method is used for circuses usually have to arrive at the stopping points so early in the morning in order to get the tents set up and have the usual morning parade, that the town in which the show is to be given generally awakes to find the circus upon it as if it came by the sky route.

The total equipment of the United States circus outfit will weigh 480 tons and this will be moved 50 miles a day, according to the preliminary plans. There will be more than 100 sleeping cars alone. These will be arranged in much the same fashion as are Pullman sleepers on the railroads. Trailers will be used to carry the seats for the spectators, platforms, reels, trappings, etc. There will be one animal cage weighing 6500 pounds; six animal cages weighing 5200 pounds apiece; fifty-four weighing 4000 pounds and ten weighing 1000 pounds each. It is expected the bodies will be built by Body of Cincinnati, Ohio.

LOS ANGELES A HOG FOR TRUCKS

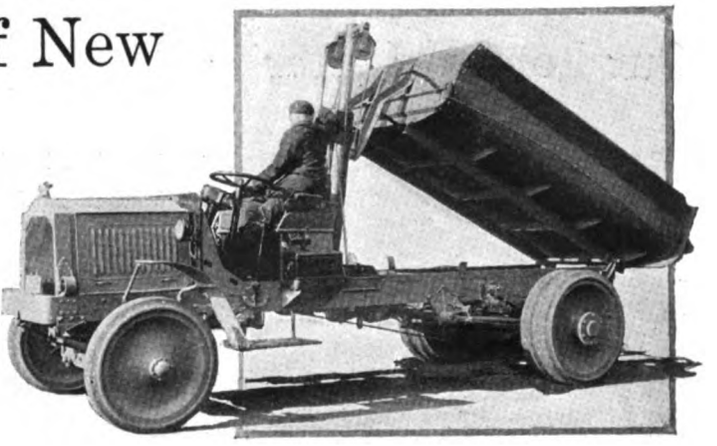
LOS ANGELES, CAL., Jan. 2—Nearly 2000 motor trucks of the larger type were purchased in California during 1916. Of that number more than one-third went into service in Los Angeles County. This city alone took more than one-fourth of all those sold in the State. There were in Los Angeles Dec. 24, 1916, 2457, as compared to 1951 at the close of 1915, and in the county there were 3290 trucks in active service.

These figures take into consideration only the trucks operating on solid tires and ranging upward from 1 ton in capacity. They do not include the hundreds of pneumatic-tired delivery vehicles, converted cars or jitneys. Of the almost 2000 trucks bought in the State, 506 went into the hands of Los Angeles users and an additional 192 came to the county outside of the city.

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Packard 5-tonner First of New Heavy Service Types

Similar to Older Chainless Models Except for Details



New Packard 5-tonner with a hydraulic dump body in action

A NEW series of Packard trucks known as the Heavy Service type has been brought out. With the exception of the four-speed gearbox, centrally located change speed lever and a thermostatic water control, these new Packards are practically identical with the first series of worm-driven models produced by this company.

The motors in these trucks, with the exception of a thermostatic cooling control and minor improvements, are the same units that distinguished the first Packard worm-driven trucks. The thermostat is a device that enables the motor to warm up quickly to efficient running temperature by closing off the cooling circulation until the desired temperature has been reached.

Probably the most important innovation in connection with the new series is in the new gearbox. This is especially adapted for the moving of heavy loads, and provides for a wider application of motor effort through four speed combinations. There is an extra low gear provided to give maximum tractive effort, so that the new truck has particular advantages in starting with heavy loads in overcoming bad road conditions. By the use of four speeds less time will be lost on hills through the wider choice of gears, and the fourth speed, which is direct, will provide a gain in economy through its higher ratio. The gear shifter lever is centralized.

Maximum speed is automatically governed with the standard speed at 11 miles per hour. If desired, a special high-speed type can be secured with Sewell cushion wheels having a speed of 13 miles per hour.

The engine is mounted under the hood and is a block, L-head, 5 by 5½ in. unit, with an S. A. E. rating of 40 hp. It is carried on three points of suspension and can be removed without hoisting by taking off the radiator and front bumper and then disconnecting the attachments. The valves are alloy steel and are covered with dust-proof casings. Internal parts of the engine follow conventional practice, the pistons being fitted with concentric rings, the connecting rods are I-beam drop forgings and the crankshaft is a four-bearing unit.

A feature of the crankcase casting is that it has a horizontal web protecting the carbureter and motor accessories from mud and water. In making repairs and adjustments the entire bottom pan can be dropped without disturbing the main bearings. There is a separate housing bolted to a flange on the crankcase back of the flywheel housing, holding the clutch.

A train of helical gears drives the valve mechanism. The camshaft is a forging with the cams integral. The cam faces are hardened and ground with the bearing diameters enlarged so that the shaft can be withdrawn endwise without disturbing the bushings.

A pressed steel tank under the driver's seat having a capacity of 27 gal. carries the gasoline supply. Positive feed is maintained from this by an automatic pressure pump operated by the motor. For starting there is a hand pump attached to the dash. The carbureter is the Packard design and is a hot-water-jacketed type, with the air intake under complete control to facilitate starting and secure economy of operation. Lubrication is by a combination of pressure and splash. The oil is circulated by a gear pump located in the lower half of the crankcase and driven from the camshaft by spiral gears. This gives pressure feed to the main bearings, while the other parts of the engine are lubricated by the overflow from the piston pin bearing and by spray from the lower rod bearing. The timing gears are lubricated by an overflow from a by-pass at the front of the motor. A gauge on the dash shows the oil pressure and the capacity of the crankcase reservoir is 3¼ gal.

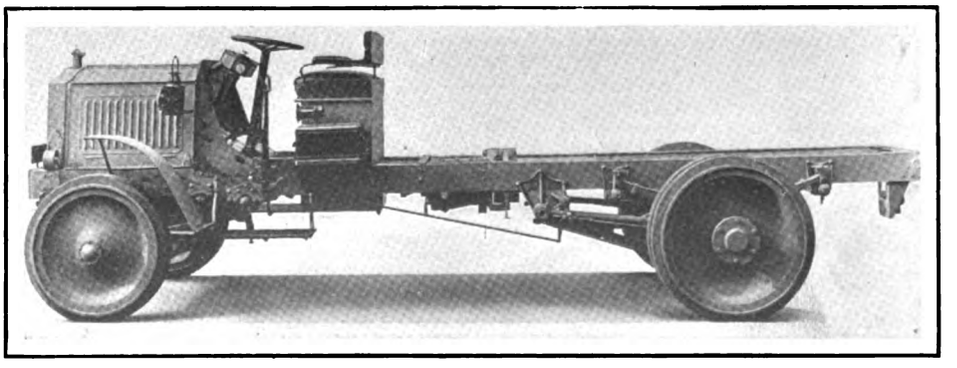
The introduction of a thermostat into the cooling system is the only change to be noted in this part of the engine. This thermostat, placed in the water line, regulates the proportion of cool water drawn from the radiator. The amount will vary with the temperature of the water in the cylinder jacket, so that at all times the engine is operating at its most efficient temperature. Circulation is by gear-driven centrifugal pump mounted on the left side of the engine and the radiator is a cellular type, sheet-metal incased, mounted independently of the hood. The capacity of the water system is 9¾ gal.

A centrifugal governor limits the motor speed to 11 miles per hour. This governor is entirely inclosed and sealed so that it cannot be tampered with by any unauthorized person. The governor acts upon the motor throttle. Ignition is by high-tension magneto for running, with a battery system for starting. A lock is provided on the ignition switch, which is mounted on the control board.

From the engine the power is transmitted by a Packard dry-plate clutch completely inclosed in a separate housing. The unit may be removed if necessary without disturbing the steering gear or motor. It transmits the drive to the gearset, which is independently supported at three points by two pressed steel frame cross members. It is centrally located and the driving connection between the clutch and this unit is through a double fabric disk type of universal joint made with pressed steel guards. From the gearset the power is transmitted to the worm shaft through the final shaft and two universals fitted with metal grease retainers. All the gears in the transmission system are of alloy steel and the change gear set is controlled by a center shifting lever and has four forward speeds with direct in fourth.

Final drive is through a built-up rear axle in which the weight of the truck is carried on heavy steel tubes which are forced under hydraulic pressure into a strong central cast steel housing. The worm is mounted above the worm wheel and is mounted in a unit with the wheel and differential in a cast steel carrier which is bolted in place in the center housing of the axle. The entire unit can be readily disassembled without taking the axle from the truck.

The frame is of channel section, rolled steel, with pressed and tubular cross members, springs are semi-elliptic all around, and the wheels cast steel disk-type, with the hubs cast integrally with the web of the wheel. The brakes for service are mounted on a drum at the rear of the gearset, with internal expanding brakes on the rear wheels for hand use. Steering is by worm and nut, with the worm integral with the shaft and with a heavy oval section forging integral with the knuckle for a cross-rod lever. The steering knuckles are of the inverted type.



Side view of Packard 5-ton Heavy Service model

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Our London Letter

By R. Douglas-Vickers

RESTRICTIONS ON MANUFACTURE CREATE DEMAND FOR AMERICAN TRUCKS — KEROSENE FUEL—IRISH MARKET

LONDON, ENG., Dec. 1—Early in the new year, it is reported, there will be a relaxation of the prohibition on British factories in regard to the supply of trucks to private customers. Personally I cannot find any very substantial support for the statement or rumors which have reached me from two quarters. Even if the needs of the government were satisfied the laborer would be wanted for work other than the manufacture of trucks. The probability is that it will become more difficult for ordinary traders to get machines released from British factories. It is an open secret that plans are being made for the 1918 campaigns and that, of course, means that the transport needs of the new armies will have to be provided for.

Makers Antagonize Dealers

The efforts of the Motor Traders' Assn. to get some sort of working arrangement with the British commercial vehicle manufacturers have ended in failure. The latter have declined to allow exclusive territory to the dealers or any commission business from large users. They contend that the dealers have not helped them in any way so far, and they see no reason why they should hand over any part of their business to those who, they say, have done nothing to deserve it. This attitude may turn many of the dealers into the truck import business, for they are fully bent on getting a share of the trade in commercial vehicles, which they believe they can handle quite successfully. If they demonstrate that they have fully grasped the service idea they may do well, otherwise I should say there is not likely to be much profit in merely selling trucks.

American-made trucks are still coming in in small numbers, not so great as in the early part of the year, but, as a matter of fact, there has been a slight falling off in the demand. Quite a number of the British manufacturing firms were able to supply machines under the release scheme sanctioned by the War Department, but these releases were given sparingly and only to such firms as were at work on government contracts. Side by side with this procedure the importing firms were supplying hundreds of American trucks to all those concerns who could not wait for British trucks or who were not certified under the release scheme.

Munitions Ministry Aids Importers

The Ministry of Munitions has issued a new order which may give a fresh impetus to the business done by importing houses. The tenor of the order is that no persons or firms can undertake the assembling or erection of new internal combustion engines, chassis or complete trucks to be used for mechanical traction without the express permission of the Ministry, the work to be certified by one or other of the government departments interested in the matter. So far as British makers are concerned it is a bit difficult to see what practical efforts the new order will have, as the release scheme was of pretty much the same nature. It may be that the conditions governing the grant of a permit to make a new truck will be much more stringent, and doubtless this will prove to be the case.

Up to the present, various makers of steam-driven trucks have been able to execute orders, but these are covered by the new regulation. It is quite unnecessary to speculate as to the reasons for the step taken by the Munitions Department inasmuch as the result will be an evergrowing supply of projectiles and other deadly machinery of war.

Whatever the results may be, the G. M. C., Federal, Denby, Selden and Bessemer people have no reason, so far as I can see, to complain of the amount of business done by them during the past 12 months. These are the trucks so generally met with in civilian as distinct from military service.



Peerless 3-tonner transporting fruit from a Maidstone farm in the southeastern corner of England to Covent Garden, London's produce market



A Peerless bringing a load of hampers into Covent Garden

I have been constantly on the lookout for one or other of your four-wheel-driven machines engaged in ordinary transport work but have failed to see one. Of course the military have got plenty and I have frequently seen both Jeffrey Quads and F. W. D.s with full loads running very smoothly indeed under none too favorable conditions. These two makes have given splendid service where the road surfaces have been bad, and most of those connected with the mechanical transport service say that they are the war truck *par excellence.* I do not consider the four-wheel system of driving will make much headway in this country, where the road conditions favor the two-wheel drive and a maximum load. As it is, the war experience they have gained has made not a few builders here consider the question of providing for locking the differential gear when the truck gets into difficulties on soft ground.

By the time this letter reaches you the bulk of the motor truck business on this side will have been cleared up for the year. During the past month there has been a distinct slackening off in motor vehicle purchases and in well-informed circles it is believed that this state of affairs will continue for some time. This weakness of the market applies to both British and American products alike, although concessionnaires for the latter have a fair number of chassis in hands to meet any demands which may spring up from any quarter. The position as regards British makers is unchanged, their output or their services being fully occupied in other directions.

Importers are still bringing in a few trucks from your side of the Atlantic, but these are mainly to order and are for firms which have already had vehicles of the same make. I take it that the significance of the repeat orders for American truck chassis is the satisfaction given by those first purchased. As a matter of fact, I have had a number of opportunities recently of ascertaining the truth of this, not only from dealers but from users themselves.

It is important to note that these cases of repeat orders are usually through dealers who fully appreciate the value of the service idea and know how to apply it. The most successful dealers, or traders as we call them here, are those who have laid themselves out to do any overhauls or repairs which the

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truck owner may find necessary at any time. In this way the motors will be kept in good running condition and the fact that replacements can always be attended to with a minimum of trouble is giving the user here greater confidence in regard to the use of foreign-made trucks.

U. S. Trucks, British Assembled

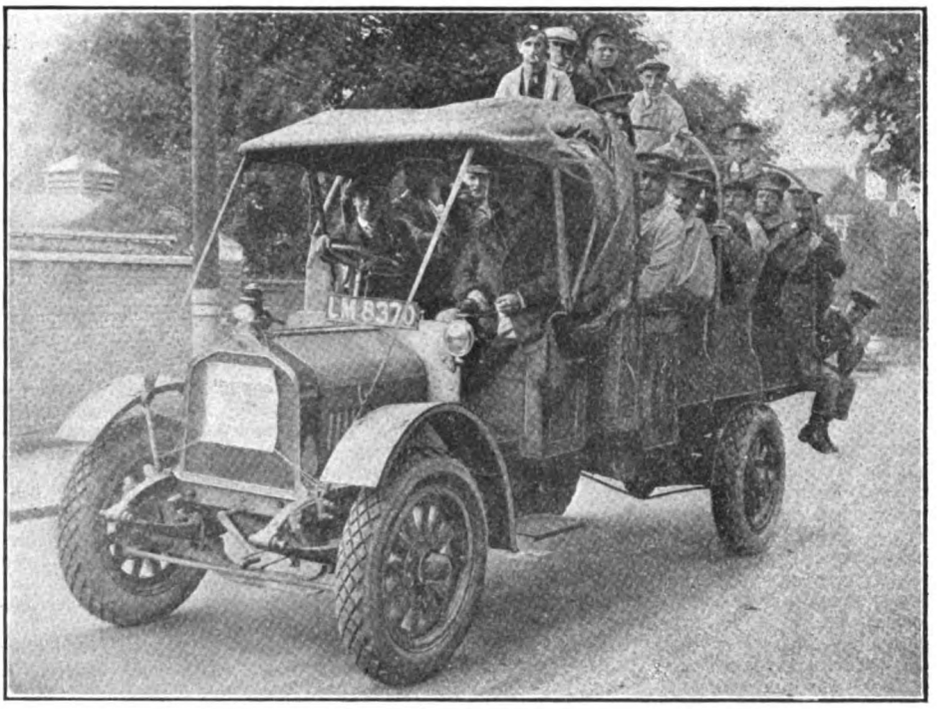
In previous letters I have drawn attention to the fact that a number of chassis have made their appearance on this side, the principal components of which are imported from the United States. These assembled vehicles appear to be standing the test of service very well indeed. A new vehicle known as the Clydesdale and falling in this category has made its appearance.* It has been placed on the market by a shipping corporation—Messrs. R. Mardens Co., Ltd.—but the man behind the truck, so to speak, is Mr. Charles R. Clark, late of Whiting, Ltd., London. The last named concern is well known here in connection with Federal and Denby trucks, of which it has sold large numbers, mainly due to the enterprise of Mr. Clark, who was general manager, a position he held for some years. One is therefore reasonably justified in expecting that he will make a success of the Clydesdale, although it is scarcely the happiest moment for a new venture.

The chassis is being offered to the public in three models for dealing with light, medium and heavy loads, and from what I can learn it has made a very good first impression. Generally speaking, the Clydesdale has been designed on British lines, and for that reason it ought to commend itself to the using public here. The back axle is a Timken-David Brown outfit, overhead worm driven, the other features being a Continental engine with Stromberg carbureter, and Brown-Lipe gearset. These particulars apply to the two larger models, the 3½-ton and 4½-ton sizes. The 25-hundredweight delivery van which is to run on pneumatic tires is fitted with a Beaver engine. A Salisbury bevel-driven back axle is used in this model.

Another assembling concern is that of Messrs. Henry Garner, Ltd., Birmingham, which has recently put two models on the market.† Those that had already been introduced have proved so very successful that the firm had every encouragement to expand.

*This is the Krebs truck, which is exported in knock-down form.

†This is the Gramm-Bernstein chassis.



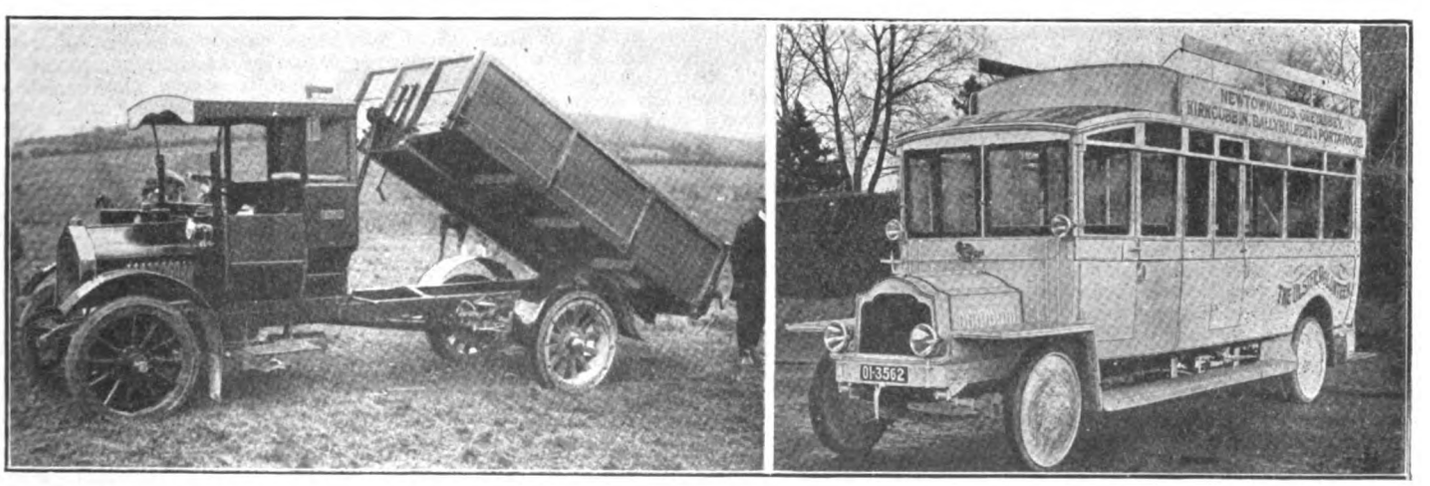
A Goodyear-pneumatic-shod Selden taking a load of wounded Tommies for an airing

More Ink Than Coal Oil

In your letter of July 27 you raised the question of the progress which we have made on this side in the way of kerosene. We have gone ahead somewhat in the use of kerosene fuel, but you must not judge our rate of progress by the amount of printer's ink spilt over the subject. The passenger car users have always loathed the use of kerosene, paraffin we call it here, on account of its malodorous, creeping qualities. And, of course, it was not until the last year or two, when there was a threatened shortage of gasoline, or petrol to give it its British cognomen, that the private owner ever dreamed of using anything but the customary spirit. Almost at any price he would use it, mainly because it was reliable, created no mess or offensive smell and could be relied upon in starting up.

On the other hand, the commercial vehicle owner has always had a tendency to experiment with kerosene, especially when gasoline first cost more than 20 cents a gallon. About that time kerosene was obtainable for half this amount. It cannot be said that many of the early experiments in fitting omitable vaporizing apparatus were successful. Thornycraft and Albion engines certainly were made to use kerosene with advantage abroad in hot climates, but many devices fitted on trucks here in England were until 2 years ago quite worthless. I have seen a good deal of money wasted and much disappointment through the fitting of kerosene vaporious.

The chief difficulty, and one well known to engineers, was to secure complete combustion of the vaporized charge when it had been drawn into the cylinders. The next difficulty was to prevent the connecting-rod bearings from being upset by a poor lubricant, the result of kerosene percolating through into the lubricating oil from the cylinders where condensation of the unexploded atoms had taken place. Where kerosene



Two American chassis used in Ireland—at the left a 2-ton Selden with a dumping body—at the right the Irish idea of grandeur in a motor bus mounted on a Packard chassis

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was used trouble with the connecting-rod bearings began to show itself, sometimes in 3 months or 6 months as the case might be.

In slow-running stationary engines the successful use of kerosene was perfectly understandable, but to use it in the engines of motor trucks where a water-cooling system was employed, where the revolutions were 1000 per minute or more, where the load on the engine was constantly varying, was quite another matter. Here was a problem which demanded nothing very abstruse but something very ingenious. I am not prepared to say which, if any, of the numerous devices recently placed on the British market is the perfect vaporizer. I have seen most of them tried and know that many of them are in use. How they will turn out remains to be seen. It may safely be said that one will do better on a certain type of truck engine than another will, and under these circumstances it would be sheer rashness to say that we have got a really tip-top good all-round kerosene vaporizing device.

Some Promising Outfits

The King apparatus is perhaps the most outstanding; then there are the Haddon, the Binks and the Morris. A large brewery company has a fleet of forty or fifty trucks fitted with a device known as the United, which has been known to give remarkably good results and without any trouble, or at all events comparatively little trouble. I understand the makers of this apparatus have fitted several hundreds and that it is doing quite well.

As I have already said, time alone will best show the truth of the claims made for these vaporizers. So far as I can gage the matter, I should say that kerosene is being used in from 10 per cent to 15 per cent of the truck engines on this side, though probably it is nearer the former figure than the latter. Motor bus and char-a-banc owners have, during the past year, done a great amount of work with this cheaper fuel largely because they were unable to get the full supply of gasoline.

Briefly I think it may be said that the chief difficulties in the use of kerosene have been:

1—Difficulty of starting up from cold.

2—Imperfect vaporization.

3—The difficulty of keeping the connecting-rod bearings perfectly lubricated owing to the cutting action of the kerosene on the oil.

As to acceleration and carbonization there has not been so much trouble, at all events, in connection with recent progress.

I am inclined to think that we are yet some way from finality, though every gallon of kerosene used helps to relieve the demand on gasoline and possibly prevents the price of the latter from going up still higher.

Hitherto kerosene has been free from an excise duty if used as a motor spirit for use in the engines of motor vehicles, but it is not at all improbable that so far as its use in commercial vehicles is concerned the present duty of 6 cents a gallon which is levied on gasoline will be extended to cover the heavier fuel.

Toward the end of the summer the police were given powers to prohibit the use of motor spirit in motor char-a-bancs where these were run for purely pleasure purposes. The owners reading into these regulations that only gasoline was meant proceeded to run on kerosene or some other substitute, but notwithstanding they were summoned for a contravention of the law and the magistrates decided that kerosene was a motor spirit within the meaning of the act which imposed an excise duty on gasoline. If this contention is maintained by the higher courts we may see the price of kerosene, which is about 20 to 24 cents per gallon to-day, increase by the amount of the excise duty.

Electric Vehicle Progress

The electric truck business has made considerable progress since I last wrote you regarding this form of traction. In and around London there are a large number of users, including several railway companies, dock and wharf concerns and private traders. Messrs. Joseph Lyons & Co., Ltd., who are the Childs' of London, have quite a number of G. V. electrics in use and with particularly happy results. They are used for delivering confectionery from the central establishments to the various depots throughout the Metropolis. Then there is Boodsbash Chemists, another important concern which has used both gasoline and steam trucks in previous years. It has gone in for trucks fitted with the Edison nickel storage battery, which has proved highly successful in this country since its introduction.

Naturally the principal users are those public bodies who have the responsibility of providing power and light for towns and cities. They have encouraged the adoption of electric trucks for the simple reason that it means fresh revenues to the central stations. I do not think they have done as much as they might have done in the pioneer work of popularizing this form of traction, but one has to remember that they have to carry on under war conditions, which makes even their normal work difficult. When circumstances permit I anticipate that electrics will do well over here.

An important concern has recently taken over the representation of Buda electric trucks for warehouses and factories. Large numbers are in use at the principal munition working centers and from what I can learn they are proving to be great labor-saving devices.

The Associated Equipment Co. of Walthamstone, well-known as builders of the London General Omnibus Co.'s B type buses, is making use of these small yard trucks and find them extremely useful. In this case they are G. V.s with Edison batteries.

Two additional American farm tractors have made their appearance in England. One is the Bates Steel Mule and the other the Standard-Detroit. The agency for the latter has been secured by the people who are handling Federal and Denby trucks in this country—Messrs. Whitings, Ltd., of London. One of these Standard tractors is already at work on farms in Kent, one of our most fertile counties. If it makes a good impression there I can see that the agents will do good business. There is a general feeling that there is going to be great progress made in farm motor traction during the next few years.

Compared with America, little attention has been paid to the use of gasoline tractors on British farms. The agriculturist here has the reputation for being extremely conservative, though as a matter of fact farmers are alive to the tractor's advantages all the world over. Still I am glad to say that during the past year we have witnessed a fair amount of work done so as to bring into favor the use of the farm tractor. Demonstrations have been held all over the country and these have been well attended by farmers who are feeling the need of mechanical aids now that the army has taken away so much agricultural labor. Nevertheless, interested as our people may be in the new power, its adoption on an intensive scale is likely to be slow, for conditions are by no means as favorable here as with American farmers. The tractor that will do well on a light soil in a fairly flat district will not as a rule suit a heavy clay soil or hilly land. The narrow headlands in British fields are also more or less against the economical employment of tractors, though, of course, this is a difficulty that could be got over.

Farm Tractors

The subject of farm traction gained considerable importance, so far as the use of motors is concerned, by reason of a very important paper submitted to the recent meetings of the British Association for the Advancement of Science by Mr. C. B. Fisher, a well-known agriculturist. This gentleman considers that the practical agriculturist has been brought into sympathy more quickly with the educational side of the agricultural industry by the tractor demonstrations to which I have referred. He further states that it is desirable that a body like the Royal Agricultural Society of England should at the earliest possible date hold tractor trials, but it is quite clear that any such trials cannot be held until the British makers are in a position to participate. In dealing with the difficulty of comparing trials conducted under various conditions on different soils, Mr. Fisher says that "The variation of the dynamometer effort required to move different soils is enormous, and it is useless to compare a machine which is tested on a good soil, on which the pull required for a single-furrow plow 9 in. wide and 5 in. deep is approximately 500 pounds, with another make of machine plowing heavy clay which requires generally a pull of 1,000 pounds, which when really hard and dry would register 1,200 pounds and would be heavy work for four horses to one plow.

"Equally important is the question of horsepower. Every maker states the horsepower of his machine, and the intending purchaser compares the price and weight per horsepower of various makes, and possibly the consumption of fuel per horsepower for work done, to endeavor to arrive at their comparative value, but this is worse than useless without a uniform system for the calculation of the horsepower basis. The R. A. C. rating has been adopted for motor cars, and it would be a great assistance if some uniform system of rating were adopted and insisted on by the Board of Agriculture for motor tractors. Then again, in any tests of cost per acre of fuel and labor, care must be taken to base calculations on equal prices."

Mr. Fisher informed his audience that he has been using a 20-hp. Universal tractor which cost inclusive of a winding drum $1,475. With this he used a three-furrow plow at a cost of $100, which was the only special implement bought for use with it on his farm of 850 acres. Of this 455 acres are arable and vary from light soil to heavy clay. With the tractor plowing these furrows

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he found the consumption to be about 3 to 4 gallons of kerosene, 1 quart of gasoline and 3 pints of lubricating oil to the acre. About 5 acres were plowed daily with this tractor, mostly on stiff land. When engaged on purely road haulage work the tractor draws 5 tons at about 5 miles per hour and makes three journeys of 18 miles daily on 7 gallons of kerosene.

The following expression of opinion on the subject of British and American tractors is worth noting: "Those made in England are the result of the study of our requirements, and one particular feature in which many of the American machines are lacking is their unsuitability for haulage, from the fact that they do not require this for hard macadam roads in their own country."

Mr. Fisher mentioned an example of co-operative ownership on the part of the Rutland Branch of the Agricultural Section of the Women's Legion—a war organization. Through subscriptions from its members it has procured a 25-hp. Mogul tractor, a four-furrow plow and a cultivator. A demonstration was held on June 19 at which over 100 farmers were present, and as the tractor has since been continuously employed, and as the farmers expressed great appreciation of the help it is to them, it was decided to procure a second engine and plow of the same makers.

The wide publicity given to Mr. Fisher's address and the interest aroused by it will, I make no doubt, do much to help along the farm tractor movement and good results are represented over here: The Mogul, Bull, Sandusky, Emerson, Allis-Chalmers, Overtime and Holt Caterpillar. They are being handled mainly by motor vehicle dealers, but I am not sure if they are the right channels for their distribution. However, that remains to be seen.

I am not in a position to say the extent of the imports into this country of American-made tires. They must be fairly considerable, and that fact is no doubt responsible for the heat with which British tire workers are criticizing the government here because foreign tires are allowed to come in free of duty. When it was decided to put an import duty on pleasure cars and parts thereof it was generally believed that rubber tires would be included but those who thought so were doomed to disappointment. The government it appears had concluded a bargain with the United States rubber manufacturers in which they agreed to allow the latter to get liberal supplies of raw material to keep their factories going and having done this, it seems only a natural thing that they should have excepted tires from the scope of an import duty.

American Tires Plentiful

British rubber goods manufacturers have, as a preliminary to future activities, formed an association and no doubt a protective if not a prohibitive tariff will figure in this program. Until quite recently they were scarcely in a position to take orders from civilian users, so busy were they on government account, but I believe that they are now able to make and supply any demands that may arise. They have—at all events this is true of the city concerns—made considerable extensions to their manufacturing plants and premises and are, in consequence, prepared for a very much enhanced output. This they would rather supply to the home market and I take it that the job would be very much easier if foreign competition were conspicuous by its absence.

The Corporation of Birmingham, which is the birthplace of the modern system of tariff reform, as we know it in this country, recently bought American solid rubber tires for its motor fire engines and the transaction has called forth a storm of protests as well as numerous sneers as to the quality of Birmingham patriotism. It has to be borne in mind that the Dunlop Corp. has its headquarters here and I suppose the action of the city fathers in buying foreign-made rubber tires is regarded in the nature of a slight.

There are three American makes of tires well known on the British market —the Goodrich, the Goodyear, and the Firestone. The service these makes of tires are giving, insofar as it relates to solids, is, I am credibly informed, very good. I have lately seen some users' letters regarding the first named and they appear to indicate a very satisfactory state of affairs. I made a note of two or three of the most interesting. Writing on September 8 last the Bolton Motor Wagon Co. stated that the American band tires fitted to its steam wagon more than satisfied it. At present this concern has five steam wagons all of them running on American tires and dealing with five-long-ton, 11,200-pound, loads and the records show that they have in many cases reached a distance of 17,000 miles and are still in good order. Messrs. Jackett Bros. of Swansea state that during the past two years they have supplied and fitted some hundred of Goodrich band tires and report that they have given really excellent results. Users have in many instances mileages of from 12,000 to 18,000. The roads round Swansea are particularly difficult, hilly and in many places do not possess the best surfaces, so that the importance of the figures given can hardly be overstated.

Introducing Internal Gears

I have had considerable correspondence during the past few months with users of trucks fitted with the internal-gear drive. The number of these is constantly increasing here and the results that are being obtained are quite what one would expect. Those U. S. vehicles of this type which I have come across are certainly not inferior to what we have been accustomed to from continental works, whether Germany or Switzerland, in days gone past. Both the Denby and the Selden are doing well and the general consensus of opinion among users is that the internal-gear drive is remarkably quiet and far from possessing any disagreeable characteristics. The only other truck fitted with this drive about which I can write with any knowledge is the Berna. It has been doing remarkably well in military service. It is essentially a heavy-duty vehicle and is distinguishable by the smooth starting action of its driving wheels giving more the impression of a rolling body than one having sudden impulses transmitted to its rear wheels and thence to the road. I believe that the tires fitted to these Berna machines are notable for the high mileages they put up and other things being taken into account for the uniform manner in which the wear takes place.

Hitherto I have said little or nothing regarding Ireland as a market for motor trucks, but it was not until lately that I was aware of the great strides that had been made there by the motor truck movement. The country has, of course, always suffered more or less owing to its poor transport facilities, the Irish railways being somewhat notorious for the poor fashion in which they serve merchants and manufacturers. During the past few years British motor manufacturers have sold a large number of trucks to such firms as Guiness, of stout fame, Jacob & Co., makers of biscuits, The Irish Tourist Development Co., and a host of other concerns. The linen industry of Ulster has gone in very extensively for the new form of traction, as indeed have such trades as flour milling, coal distribution, engineering and general carrying. The result has been that a very energetic and prosperous body of dealers has grown up and the latest reports received regarding these activities convey no idea that this has been a most prosperous year.

Trucking on Erin's Isle

In and around Belfast, American-made trucks and particularly Seldens are beginning to make their appearance, those named owing this introduction to a prominent local motor car engineer from J. B. Ferguson, Ltd., whose principal is well-known to members of the S. A. E. These people also supplied a Packard chassis to a local concern to be run on a passenger-carrying service and fitted it with a most luxurious body.

Coming to users on a smaller scale we have the inevitable Ford. Vans on this make of chassis are to be found everywhere and in every class of trade. The nicknames for the Ford are legion; indeed if I have heard one I have heard a hundred but it fills a want or these good people would certainly not buy them.

Talking of the Ford chassis one is astonished at the number of devices that have made their appearance here during the past year which have for their object the conversion of this car into a truck with a load capacity of 2,240 pounds or thereabouts. One ingenious gentleman has given us the Dixie conversion outfit which enables seven distinct types of body to be attached to the chassis in turn and with a minimum expenditure of time and trouble. In addition to the Dixie there are the Olson, the Tonlode, the Baico, the Makatruck and Heaven only knows how many others, so that the Ford may yet rival that brawny gentleman Atlas and carry the world.

Seriously, however, there is something more than this in the question of convertible bodies and I was greatly struck by one I saw recently on a G. M. C. Model 15, 2,240-pound chassis. I am told that it has solved the question of conveying munition workers to and from the various war factories. It has seating accommodation for sixteen persons and the driver. The width of the body overall on top is 6 feet; the length behind the driver's seat is 7 feet 10 inches with seats of a width of 17 inches running lengthwise down each side. The cross seat at the rear accommodates two persons while two others can sit on the driver's seat. When the vehicle is wanted for freight work all that is necessary is to lower the seats so that there is really no time lost in making the necessary transformation. To protect the goods or passengers in inclement weather a canopy is fitted as well as side curtains. All the seats are easily removable. The price of this type of vehicle complete, here, is $2,150.

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American Motor Truck Makers' Plans and Products in Brief Résumé

1917

New Models and Prices, Changes in Construction and Methods of Manufacture and Sale Outlined in Short Illustrated Notes for Buyers' Information

Part II—H-Z

COMMENCING in the last issue of THE COMMERCIAL VEHICLE and concluded in this, this series of short reviews of commercial vehicle manufacturers' offerings for 1917 and their plans for the new year is the continuation of a practice of years' standing.

Brief as they are, these items are intended to contain the salient points of importance covering each manufacturer; but they are not designed to constitute a complete description of the vehicles. Specifications of most of the American trucks were published in the Nov. 1, 1916, issue.

Only the most important or unusual structural characteristics or changes in construction are pointed out. Even with this brevity, splitting of the Résumé into two parts has been unavoidable.

Henderson

New England Makers Continue Conservative Line

TO Henderson Bros., Cambridge, Mass., 1917 will be little different from 1916, for they are continuing the same line of light worm-driven assembled trucks which were announced more than a year ago. These are of 1200-lb. and 1-ton capacity.

Their manufacturers are dealers in heavier vehicles and have been identified with the motor truck trade in Greater Boston for several years. Their truck is assembled from standard parts and is sold principally in Massachusetts.

By paying 40 per cent down and the balance in a year these little trucks may be purchased on time. Electric starting and lighting will be installed at an extra charge.

The vehicles resemble each other save for the size and strength of load-supporting portions in that they are mounted on pneumatic tires, with their unit powerplants under neat hoods, final drive being by shaft and worm-driven axles.

Hurlburt

Two Heavier Models Added to Gotham Product

MADE in New York City, but now sold throughout the East and abroad, the Hurlburt truck, one of the pioneer users of worm drive is now offered in a range of five capacities, from 1½ to 7 tons. The new models are of 5- and 7-ton capacity, the older ones of 1½, 2 and 3½ tons. The 1½-tonner was formerly rated at 1 ton.

Only minor refinements have been made in the models carried over and the two heavier sizes follow the structural plan of their predecessors very closely. During the past year the Hurlburt Motor Truck Co. has secured a larger factory in the Bronx, just north of the Harlem River, at Third avenue, and its output has been so increased that a wider distribution is planned for this year.

The Hurlburt product is partially manufactured and partially assembled, many of the parts made outside being made from the designs, patterns, tools, dies, etc., of the Hurlburt concern.

Purchase of these vehicles on partial payments may be arranged with responsible parties on a basis of 10 months' maximum time.

As a rule, Hurlburt chassis are sold stripped, but when the buyer desires, bodies will be provided by the manufacturer. Electric lighting equipment is standard without extra charge on all Hurlburt models, but not electric starter. The Hurlburt company does not believe the latter is necessary on its vehicles, although, of course, on the customer's insistence, the feature will be added at extra cost.

The Vesta lighting system is used on the 1½, 2 and 3½-ton models and the Westinghouse outfit on the 5 and 7-tonners.

No opposition is expressed as to the use of trailers in connection with these trucks, either of the separate or semi-trailer type, and if such use is contemplated the concern will, at extra cost, fit attachments especially adapted to the chassis.

In design the Hurlburt is conservative, but there are several distinctive features. All models have pressed steel frames of the rigid type and their rear axles are retained rigidly through radius rods and torque arms. Six-cylinder engines are used on the 5- and 7-tonners, fours on the smaller sizes. All models have their cylinders cast in block, and the gearsets are located amidships on all but the smallest model.

A characteristic point in the design which renders the vehicle readily distinguishable is the modified V-type radiator which is employed. On the 1½-tonner this is of sheet metal with a cellular core, but on all the others it has a finned-tube core and a cast casing.

Dual ignition is fitted on all but the smallest model, and likewise pump cooling. Fixed spark advance is used. All models have Pierce governors driven by the motor. Only the smallest size uses Hotchkiss drive.

A point upon which emphasis is laid is that liberal wheelbase options are offered to adapt the truck to all manner of uses.

Hawkeye

New Western Maker Adds a 2-Tonner to Line

ORIGINATED only in the spring of 1916, the Hawkeye line, which at that time comprised a single chassis, has already been added to by the addition of a 2-ton model to the 1¼-tonner first made. This truck is priced at $1,600 and follows the general make-up of the smaller predecessor.

The Hawkeye Mfg. & Repair Co., Sioux City, Iowa, is a new member of the truck-building fraternity, although it has been in the parts and repair business for several years. Its present product is assembled from standard parts and is conventional in design. So far the business has been confined to points adjacent to the home city, but general distribution is planned.

Time payments may be arranged so that 25 per cent is paid down, the balance being payable in 6 months with interest at 5 per cent. Further, the price under deferred payment is advanced 8 per cent.

Approximately half of the Hawkeye business is with trucks complete with bodies. The concern is not prepared to indorse electric lighting and starting, however, although on special order it will so equip its chassis. It is opposed to the use of trailers in connection with its chassis.

Hawkeye design is characterized by a smart appearance lent by the cast-case, finned-tube radiator, set far enough back to give grace to the front end and by simplicity throughout. The unit powerplant comprises a Beaver valve-in-head engine, a dry-disk clutch and three-speed gearset. A single shaft drives the Celfor internal-gear axle.

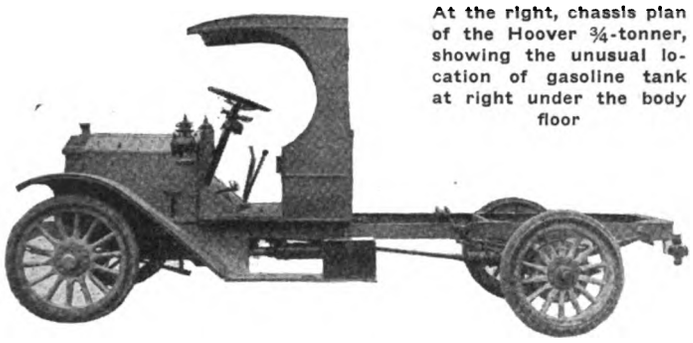
Independent

Two Light Models Continued Without Change

LITTLE change has been made in the offering of the Independent Motors Co., Port Huron, Mich. As in previous years, two models are offered, both worm-driven, but the capacity of the smaller has been increased to reduce the gap between them. Formerly they were of ¾- and 2-ton capacity, but for 1917 the smaller is rated at 1 ton. Both follow the same lines and adhere to conventional practice in engineering.

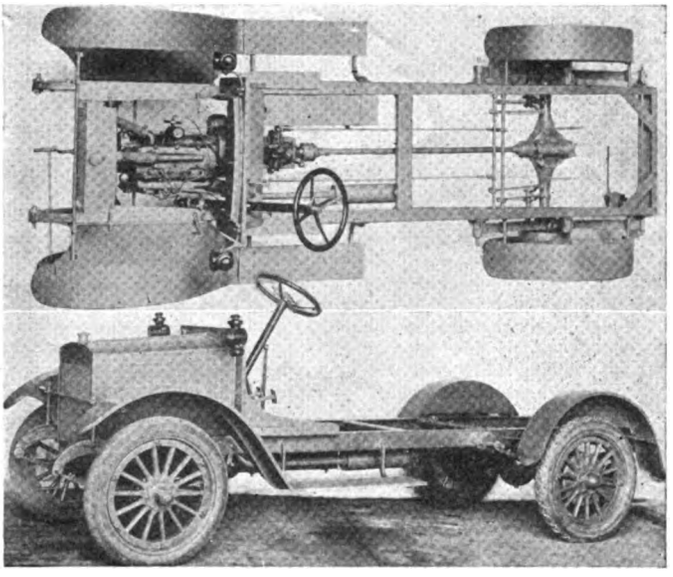
The Independent vehicle is an assembled job and is sold principally in the central section of the country. Both models are on solid tires, with four-cylinder unit powerplants comprising block-cast thermo-syphon-cooled engines, dry-disk clutches and three-speed selective gearsets driving worm-driven rear axles. Driving stresses from the axles are taken by the springs.

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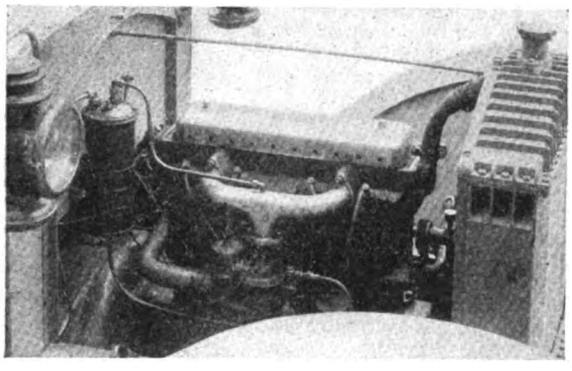


At the right, chassis plan of the Hoover ¾-tonner, showing the unusual location of gasoline tank at right under the body floor

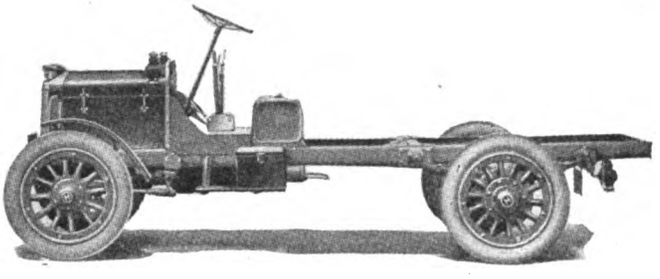
The Hawkeye 1¼-tonner, a new truck in 1916, which has a unit powerplant, a vacuum gasoline feed system and internal gear-drive with the torque and propulsion taken through the springs



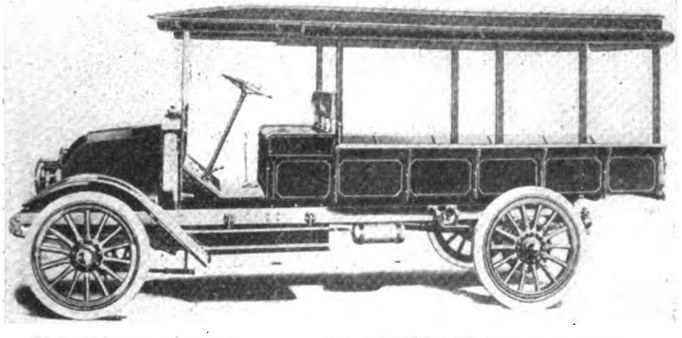
Hoover 1,500-pounder, equipped with unit powerplant, worm drive and vacuum gasoline feed system. The propulsion and torque are taken through the springs

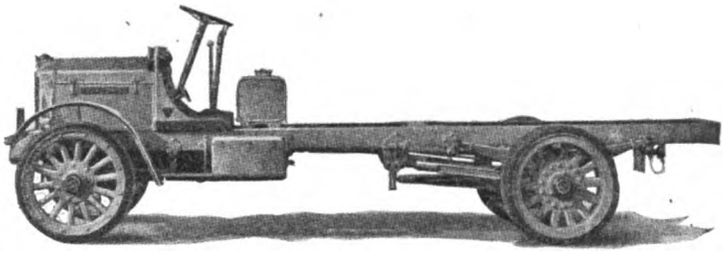


Unit powerplant of the Hawkeye 1¼-tonner, showing motor and the cast-case radiator. The motor valves are in the head and the rocker arms inclosed in an aluminum casing

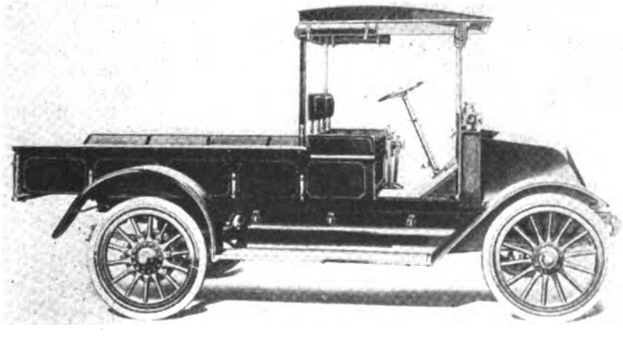


The Huriburt 1-ton worm-driven model, one of a line of four sizes, all of which follow the same general design

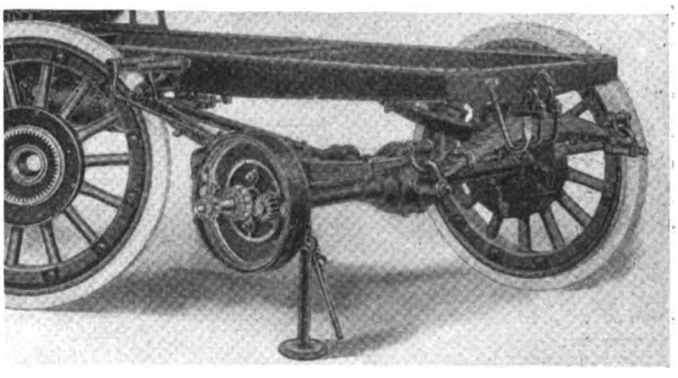




The Huriburt 3½-tonner. Note the resemblance to the small 1-tonner shown directly above. It is worm driven



At the top, the I. H. C. 1-ton internal-gear-driven truck and directly below, the 1,500-pound model of the same make. Both follow the same general design and are characterized by the use of a sloping French hood directly in front of the radiator. Starting and lighting equipment is an extra



Rear of I. H. C. 1,500-pounder showing rear springs, and internal-gear rear axle with wheel removed to show gears

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I. H. C.

Line Entirely Modernized—Only Two Models

FORMER high-wheeled buggy types of truck have been abandoned by the International Harvester Co., Akron, Ohio, and in its 1917 models are nothing but conventional structural features. Three models have been dropped during 1916 and one new one added.

Last year was the first appearance of the new type of I. H. C. chassis, when to a line of three high-wheeled chassis of ½- and ¾-ton burden was added one of 1-ton capacity. During the summer a new ¾-tonner of design similar to the 1-tonner was added.

The new models are entirely different from the older ones. Where the old ones had high wheels, two-cylinder motors located under the body, individual-clutch gearsets and chain drive, the new ones have the catholic four-cylinder engine, in a unit powerplant with an orthodox clutch and gearbox, the motor being mounted under a hood, and internal-gear final drive.

The International Harvester Corp. is one of the units of the International Harvester Co., the largest manufacturer of harvesting machinery, farm implements and agricultural tractors in the world.

Trucks have been manufactured by the International Harvester Co. for many years. Previously practically the entire vehicle was produced by the company, but in the newer designs several standard components are incorporated, such as the rear axle.

The vehicle enjoys a national sale, principally through the eighty-nine branches maintained by the company for the distribution of its other products. For this reason the I. H. C. is met with to a great extent in rural districts.

The concern has no time-payment policy, preferring to dispose of its vehicles to dealers on a cash basis, leaving the question of credit to the dealers to handle independently.

Facilities for body building are provided at Akron and a line of standard bodies are catalogued. Fully 50 per cent of the output of the concern is regularly equipped with standard bodies.

Although electric starting and lighting has not been contemplated by the concern as standard equipment, on special order it will be applied to the trucks at extra cost.

No provision is made for the use of trailers in connection with I. H. C. vehicles, as they are possibly too light to be considered for such use.

Both I. H. C. trucks follow one structural plan and are distinguished by the French hood which houses the engine. In this construction a curved scuttle-shaped bonnet covers the engine and the radiator occupies a position on the dash. The engines used on these vehicles are of the block type, with their magnetos and water pumps mounted transversely and driven by a cross-shaft at the front of the engine.

From the engine through the unit-mounted cone clutch and selective gearset the drive is taken by a shaft with two universals to the Torbensen internal-gear-driven rear axle. The trucks have Hotchkiss drive, the rear springs being of the platform type.

The North East starting and lighting system will be fitted to either of these models at an extra charge of $125 in each case.

Indiana

Capacities Readjusted, but No Radical Changes

SUBSTANTIALLY the same line of trucks which was offered last year is scheduled for 1917 production by the Indiana Truck Co., Marion, Ind. This line consists of five models of 1, 2, 3½ and 5 tons' capacity, all of which follow roughly the same plan. Slight readjustment of capacity has been effected in two of the models to make the range more even. The 2-tonner is based on the 1½-tonner of other years and the old 3-tonner has been strengthened for 3½ tons' load.

During 1916 the company was reorganized and its name was changed from the Harwood-Barley Mfg. Co. to the Indiana Truck Co., the Barley interests having gone to Streator, Ill., to establish the Barley company there. The Indiana company has been in business for a number of years, having formerly built a line of chain-driven vehicles, which were gradually altered to worm drive.

Assembled from standard parts, the Indiana truck is sold practically the country over. A credit scheme of unusual liberality is employed by the Indiana company, this being one of the prominent features of its sales policy, this being one of the first American truck manufacturing firms to advertise its time-payment plan nationally.

Electric starting and lighting is not standard equipment, but on special order it will be supplied at extra cost. The use of trailers is indorsed by the Indiana concern.

In design all Indiana trucks are alike in the use of cast-case radiators with finned-tube cores, four-cylinder motors, Pierce governors and worm drive. The smaller model has a unit powerplant and employs Hotchkiss drive, all of the others having their gearboxes amidships to reduce the free length of shafting and radius rods for propulsion, although these, too, take their torque through the springs.

Inter-State

Passenger-Car Chassis for Fast Parcel Work

PRODUCED by a concern which has made passenger cars for many years, but representing its initial entry into the commercial field, the Inter-State 850-pounder is produced by the Inter-State Motor Co., Muncie, Ind. It is interesting in that its cost is $850, or $1 per pound of capacity.

Intended for rapid delivery service, mounted on a chassis but little different from that used for passenger service, the vehicle is naturally mounted on pneumatic tires and is without a governor. In everything except the load-carrying body the vehicle is finished exactly as the passenger car is, having a highly-finished hood, cowl dash and fore-door cab and complete fender and running-board equipment, adequately winged to the frame.

Complete electric equipment, including starting and lighting, is installed, a dome light being placed within the panel body to aid in finding packages when delivering after dark.

Jeffery

¾- and 1½-Ton Sizes Added and Quad Continued

TWO new models of standard rear-driven trucks have been added to the Jeffery line. These are known as the Rapid-service and All-purpose models and are of 1500-lb. and 1½-ton capacity, respectively. They are made by the Nash Motors Co., Kenosha, Wis., successors to the Thomas B. Jeffery Co.

The four-wheel-driven, braked and steering Quad model, of 2 tons' capacity is continued without important change beyond minor refinement of detail.

The change in name was occasioned by the purchase of the holdings of the sons of Thomas B. Jeffery by C. W. Nash, since when the factory has been expanded and plans made for a greater business in commercial vehicles. The Jeffery company has been manufacturing trucks since 1912, having formerly produced chain-driven ¾- and 1-tonners. After having perfected the Jeffery Quad, 2-ton four-wheel-driven, steered and braked vehicle, the other models were dropped and by January, 1916, nothing was offered but the Quad. Early in the year past, however, the two new models were offered.

The Jeffery vehicle is largely manufactured in the Nash plant. It is sold all over the country and in foreign lands. Time payment sales are not entered into by the Nash company. Standard bodies are manufactured, but only about 40 per cent of the product is sold so equipped, and in the main it is the lighter models that are sold complete.

Although on the Quad electric starting and lighting are not standard, the smaller models have the Bijur system as stock equipment and the Nash company indorses it on all models. The same system will be applied to the 2-tonner at an extra charge of $125.

Paradoxical as it is, the Nash company, while opposed to the use of trailers, makes provision for their use on the Quad in the form of a spring-mounted drawbar.

The three Jeffery models vary considerably in details of design. The ¾-tonner has a bevel-driven axle, the 1½-tonner a Torbensen internal-gear-driven one and the 2-tonner four-wheel drive through internal-gear-driven axles, the front and rear ones being identical.

The two smaller models have their motors under the hood, and are finished in passenger car style. They have cowl dashes and fore-door cabs and crowned and well-winged fenders and running boards. The Quad, on the other hand, has its motor located under a hood which is located back of the dash and within the cab, offset to the right.

The two smaller models have four-cylinder block engines of 22.5 hp., the Quad engine being of 29 hp., by formula. All have pressed steel frames and Hotchkiss drive, the frames being of the flexible type. Unit powerplant construction is used on the smaller models, with dry-plate clutches and three-speed selective gearsets. The Quad, however, has its gearbox amidships, this model having an individual-clutch type affording four speeds.

Duplex governors, driven both from the motor and driveshaft are used on the 1½- and 2-ton sizes, the smaller being ungoverned. The latter is mounted on pneumatic tires all around. Pneumatics are also used on the front wheels of the 3000-pounder, with solids in the rear. All four wheels of the Quad carry the same size of solids.

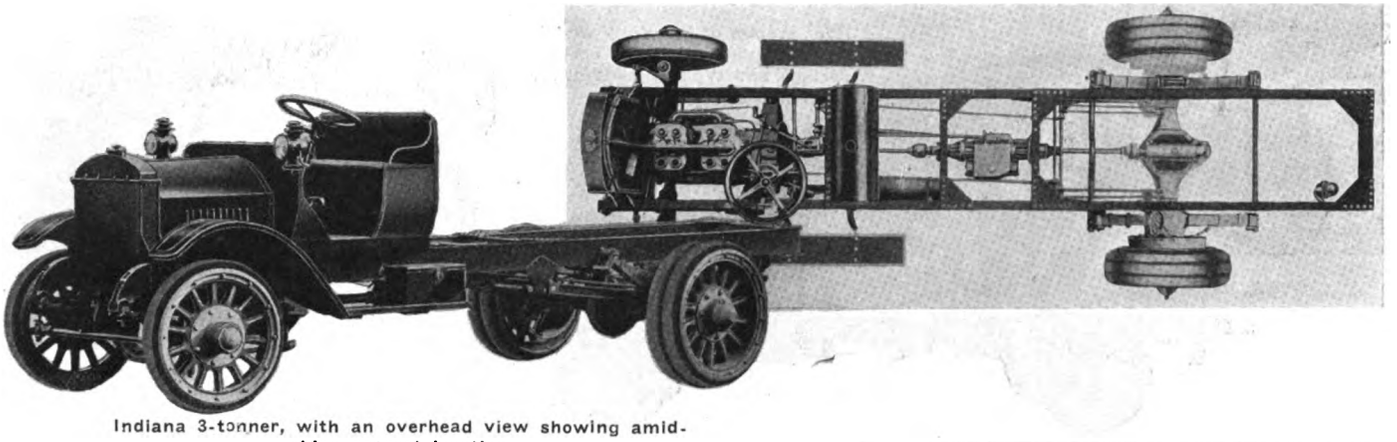
King

Single Chassis Continued Without Change

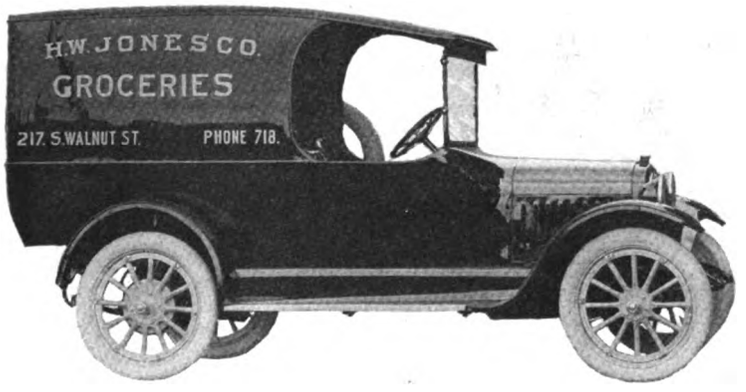
IDENTICAL with the truck made in 1916, the 1917 King product is a single model of 3½ tons capacity. It is the same design that the A. R. King Mfg. Co., Kingston, N. Y., has made for several years without change, being an American type chain-driven truck, that is, the motor is under the floor of the cab.

It is partially assembled and is sold mostly in northeastern New York state. A feature of its design is that the motor is on a three-point-mounted subframe, which may be removed from the chassis without disturbing other components. The King company indorses the use of trailers.

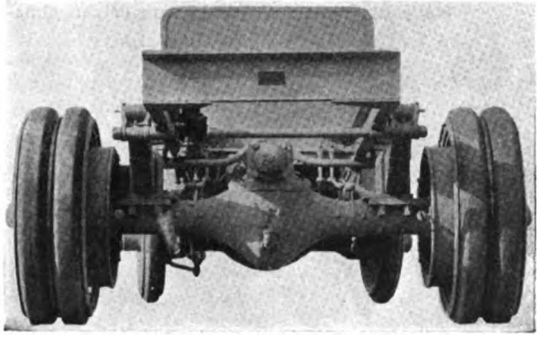
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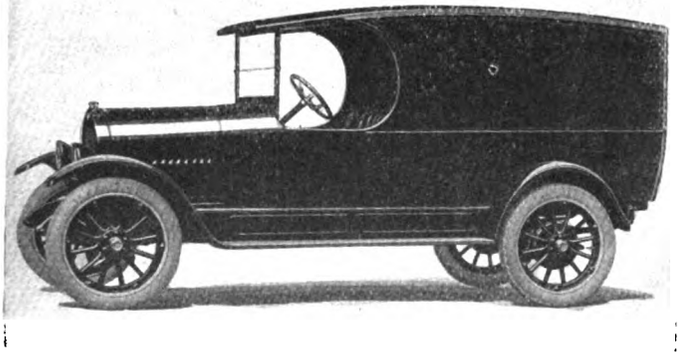
Indiana 3-tonner, with an overhead view showing amidships gearset location



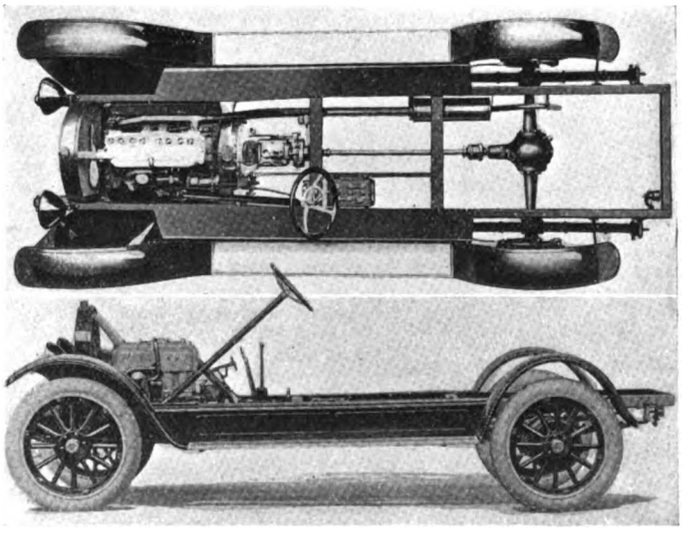
The new Inter-State DeLuxe delivery vehicle equipped with panel body



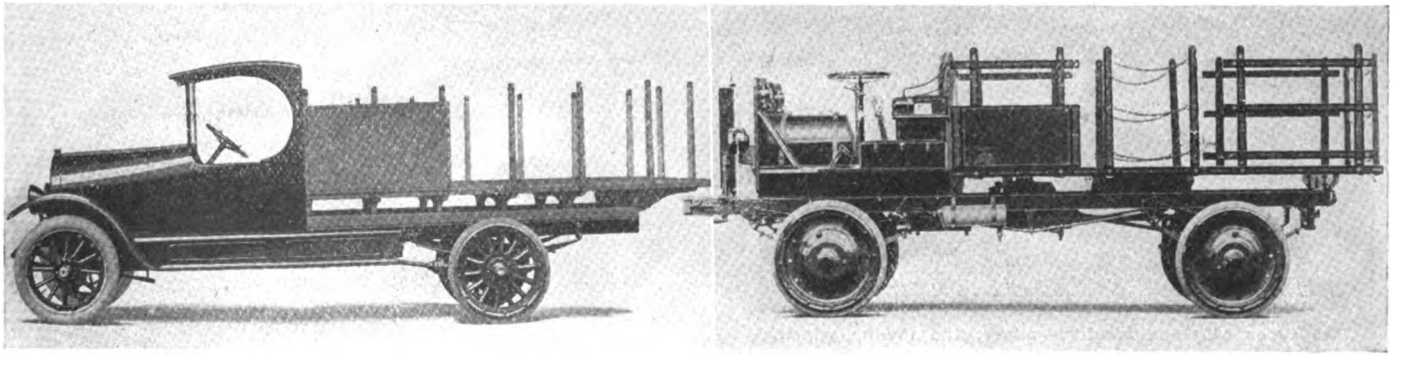
Rear view of 3-ton Indiana, showing Sheldon worm-driven axle and details of frame construction



Jeffery ¾-ton Rapid-service model, showing long, smooth lines

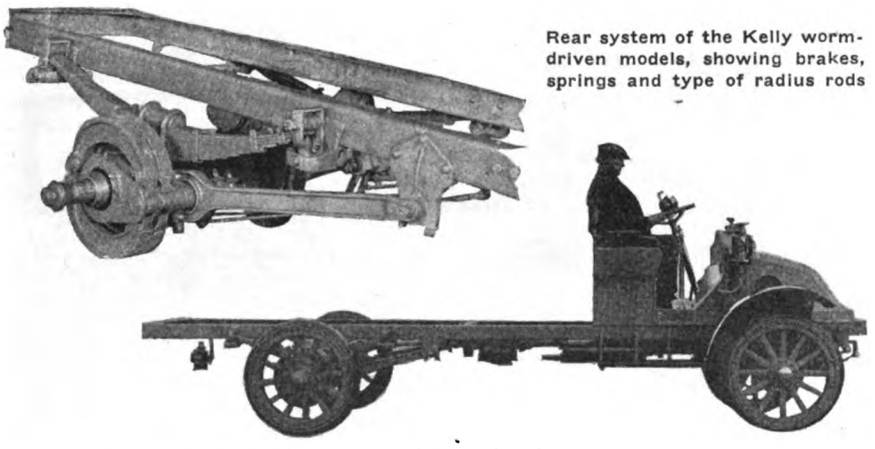


Top and side chassis views of ¾-ton Jeffery chassis, showing simple plan



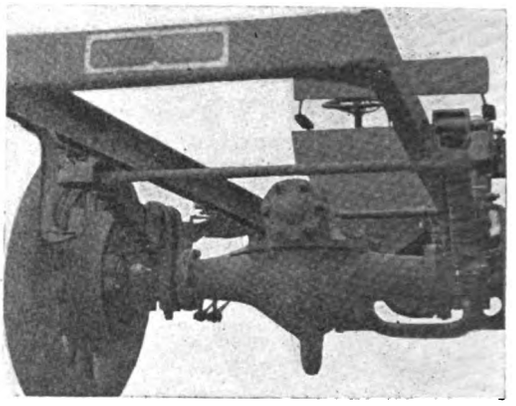
Jeffery 1½-ton All-purpose model with its stake body to the left, showing fore-door cab and the 2-ton Quad, to the right, which drives, brakes and steers on all four wheels

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Rear system of the Kelly worm-driven models, showing brakes, springs and type of radius rods

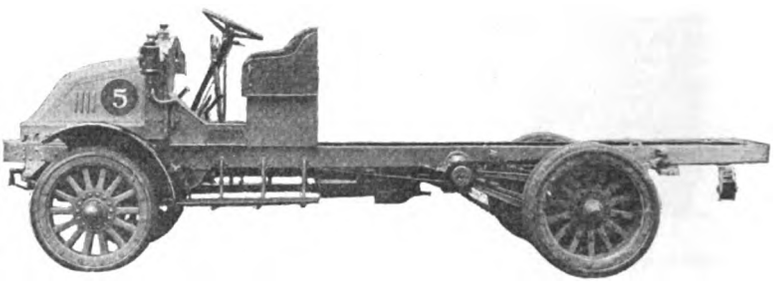
Kelly-Springfield 1½-ton worm-driven chassis



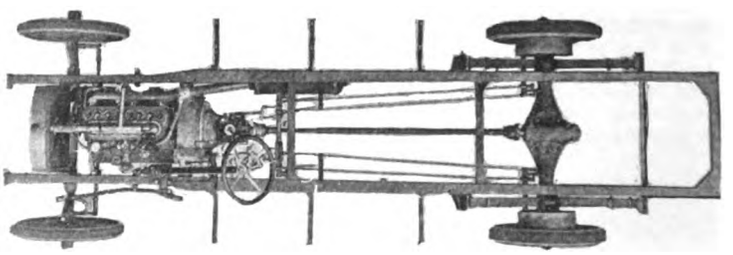
Rear view of worm-driven Kelly-Springfield, showing worm-driven axle. Note large grease-cup at left end of axle

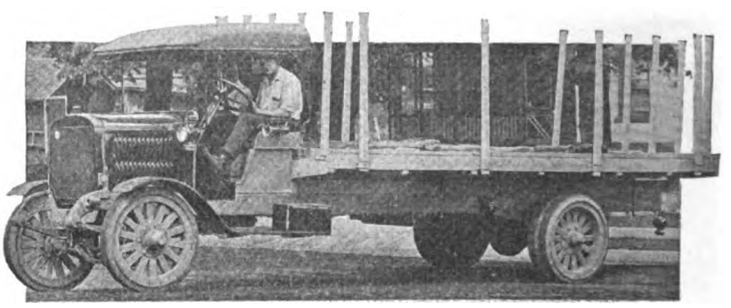


Panel body on Kisselkar 1-ton chassis

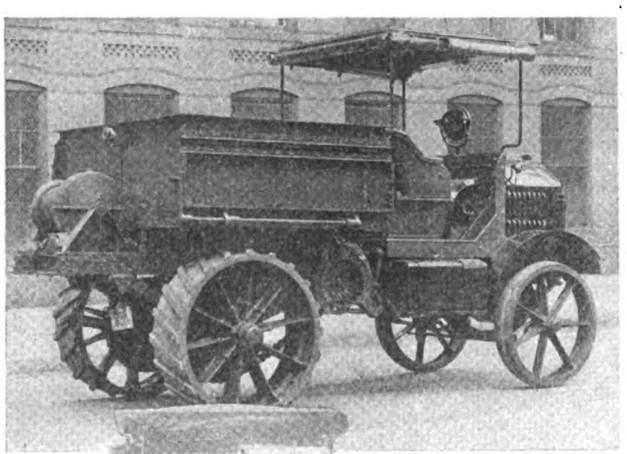


Five-ton chain-driven Kelly-Springfield chassis



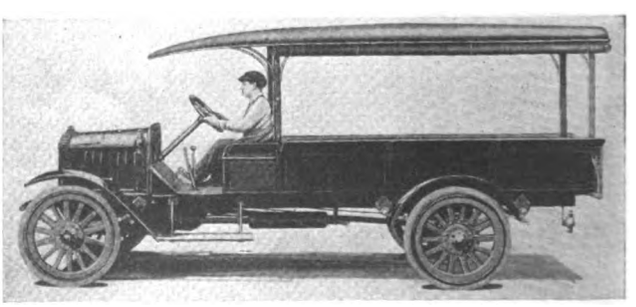


At top, Kisselkar 1-ton chassis, showing its simplicity. Below, Kisselkar 4-tonner with a staked-platform body





Two types of Knox tractors—above, the towing winch model with steel rear wheels and tires, note winch at rear; below, the standard type with a fifth wheel for semi-trailers



Koehler 1-ton truck in a standard express body

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Kelly-Springfield

Worm-Driven Models Added to Unusually Complete Line

ADDITION of two worm-driven models to a line embracing an exceptional range of capacity features the offering of the Kelly-Springfield Motor Truck Co., Springfield, O. There are now eight models and six capacities. These are 1½, 2½, 3½, 4, 5 and 6 tons capacity, the 1-tonner, 2-tonner and 3-tonner of last year having been altered to render them adaptable to the higher ratings now given them. This has been due to a closer study of actual users' requirements, which shows that the odd tonnages more closely approximate the loads really carried.

Minor improvements have been made throughout the line, but in essentials, even the new worm-driven models are fundamentally the same as previously. With the readjustment of capacities and the addition of models has come a revision of prices. This has not extended to the larger models, but in the smaller ones, it amounts to a considerable saving. For example, the 1917 1½-tonner sells for $2000, as against $2050 in 1916; the 2½-tonners at $2750 as against the same price for last year's 2-tonner; and similarly the 3½-ton model sells for the same $3400 as the 3-tonner of last season did.

The new worm-driven types are of 1½ and 2½ tons capacity and in every way except their rear systems are identical with the chain-driven types.

The Kelly company is of long standing in the industry, having commenced several years ago as successor to the old Frayer-Miller concern, taking over the manufacture of those air-cooled vehicles for about two seasons. After that the present water-cooled models were designed and have been continued without important change since that time, new models being added as time went on to embrace a greater range of sizes.

The product is made entirely from exclusive designs and largely in the Springfield plant. It is nationally sold and is also exported to some extent. Usually it is sold for cash, but in special cases the concern will accept 50 per cent on delivery and the remainder in four equal monthly payments on notes bearing 6 per cent interest.

Although the Kelly-Springfield plant is equipped to manufacture bodies to the special designs of the engineering department, and the concern is ready and willing to render body service, the concern prefers to sell its chassis stripped, since the only standard bodies are the steel dumping types.

Electric lighting and starting equipment is applied to Kelly-Springfield chassis at an extra cost of $175 net, if desired, either the Westinghouse or Ward Leonard systems being installed.

Trailers and semi-trailers are thought by the Kelly engineers to be a good thing under proper conditions and provision has been made in the chassis for this use.

The Kelly-Springfield design is chiefly characterized by a few distinctive points. One of these is the French hood, with the radiator on the dash, this hood being provided with louvres in front, screened openings in the side and an underpan of similar scuttle shape to exclude mud from beneath. This arrangement not only protects the radiator, but renders the engine readily and completely accessible by merely raising the hood in one piece.

Another feature of the Kelly-Springfield is its governor. This is of the loose-ball type, comprising an upper and lower cone, between which are free balls. These revolve with a spinning motion, thus imparting a lag to the governor which permits the motor to accelerate beyond its set maximum momentarily.

On Kelly chassis the gearbox is always amidships and correct alignment with the engine is assured by the use of a long torsion tube surrounding the clutch shaft. On the chain-driven models the jackshaft bolts to this gearset, making the whole assembly rigid. On the new worm-drivers the gearbox bolts to a yoked cross-member of the frame, from whence a short shaft conducts the drive to the axle.

The worm-driven models rely upon the springs for torsion resistance, but employ radius rods for propulsion. Although the power line of these chassis is very rigid, the pressed-steel frames on all models are notable for their simplicity and small number of cross-members, thus being semi-flexible and permitting the use of more resilient, because flatter springs.

Kearns

Two Light Delivery Models Continued for 1917

NO change has been made in the Kearns offering since a year ago, the product consisting of two models of light delivery vehicle, one of 500 lbs. and the other of 1000 lbs. capacity. They are made by the Kearns Motor Truck Co., Beavertown, Pa. This company has been manufacturing light delivery trucks for several years, having formerly made a two-cylinder chain-driven type with high wheels.

These models are mostly assembled and follow conventional lines in such sizes, having their motors under hoods with stream-line dashes and fore doors and final drive by bevel gears.

Kearns vehicles are sold mostly in the east and are regularly equipped with electric starting and lighting systems.

Kisselkar

Many Changes in Line for 1917—Prices Lower

MODERNIZATION of design and a readjustment of capacities to shorten the gaps between models constitutes the main mutation in the offering of the Kissel Motor Car Co., Hartford, Wis., for 1917. For one thing all 1917 models save the smallest are worm-driven, whereas last year only two models out of six were. The ½-tonner of 1916 is this year a ¾-tonner, although the price remains the same. The 1-tonner has been reduced in price from $1500 to $1250. The 2-tonner has been reduced from $2100 to $1875. The 3-tonner has been reduced in capacity to 5000 lbs., and in price from $2750 to $2250. The 4-ton model's price has dropped from $3350 to $2850, and the 5-tonner's has slid down from $4350 to $3350—a cool thousand, its capacity being cut also from 6 tons.

The Kisselkar has an entirely new set of motors for the heavy sizes. The new ones are of the same block type, with valves to the right that have been used for several years on the smaller types. These motors are the same as used on the 2-tonner last year and are found today on the 2-, 2½-, 4- and 5-ton sizes. They are of 29 rated horsepower, with cylinders 4¼ by 5½. The 3⅞ by 5½, 24.22 engine of similar design which was formerly used on the ½- and 1-tonners is now found in the ¾- and 1-tonners. These motors are built in the Kissel shops.

Another improvement in the Kissel chassis is the addition of vacuum feed for the carbureter, the Stewart system being used. The fuel tank is under the seat as before, the vacuum feed being used to permit of sure feed regardless of grade and to permit carrying the carbureter higher on the motor, so reducing manifold length. Dry-plate clutches have replaced those of the cone type on all but the two smaller models and unit powerplants are now found in all but the 4- and 5-tonners, where formerly they were used only in the two smaller sizes. All models now have Hotchkiss drive.

An unimportant change has been made in the design of the hood. This year all hoods are notable for their height, which permits the use of large radiators and by the impressive double row of fine louvres along each side.

The Kissel company has been building trucks for many years, and this is the first year when it has not built chain-driven ones. The truck is partially assembled and partially manufactured, the production of its own engines having always been the policy of the concern.

Distribution of this product is general all over the country. Credit sales are arranged through banking connections.

Eighty per cent of the output of the Kissel factory is shipped without bodies. The Kissel company is prepared to furnish them, however, if desired. The same remark applies to electric starting and lighting, which is not regularly supplied, but which, on all but the 5-tonner, will be supplied at $150 extra. The Remy two-unit system is employed.

The use of trailers is not discouraged by this manufacturer, and if desired attachments will be made to adapt the chassis to their use.

Kleiber

Two New Models—Prices of Heavy Sizes Increased

PACIFIC coast made, the Kleiber truck for 1917 is offered in six sizes, two light ones having been added to round out the catalog. The Kleiber Co., Inc., is located in San Francisco, and has been in business for several years, during which time its business has expanded from one local to its home city and its suburbs across the bay, to a distribution embracing the whole of the Pacific Coast territory.

Two models have had their prices raised, these being the 3½-tonner, increased from $3300 to $3500, and the 5-tonner, from $4250 to $4500. The new models are of 1750 lbs. and 2 tons capacity, the former being the smallest truck so far built by this firm.

During the year the manufacturer was incorporated, the old concern being Kleiber & Co. This, the addition of new capital and an expansion of the plant, has enabled the Kleiber company to face the new year prepared for a bigger business than ever.

The Kleiber is an assembled truck and is sold on time payments to responsible parties. The use of trailers is encouraged, and while no auxiliary electric equipment is fitted, electric lighting will be installed if demanded, at extra cost.

The complete line comprises trucks of 1750 lbs., 1½, 2, 2½, 3½ and 5 tons capacity, all worm-driven on the Hotchkiss plan excepting the new 2-tonner, which has radius rods. They have rolled channel steel frames and standard construction throughout.

Knickerbocker

Product Confined to Larger Sizes—More Capital

AFTER several years of conservative manufacture on a small scale, the Knickerbocker Motor Truck Co., New York City, has been reorganized and expects to undertake the manufacture of its heavy trucks on a larger scale during 1917. The

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present offering comprises a continued 3½-ton model and a new 5-tonner, last season's 2-tonner having been abandoned since the concern is acting as distributor for another line of lighter vehicles.

The 7000-pounder has been radically changed in design and greatly increased in price. The 1916 Knickerbocker was worm-driven, with a cast-tank finned-tube radiator. The new model has gone back to double-chain drive and the use of a sheet-metal-incased square-tube radiator. The 1916 price was $2850, that for 1917 being $3500.

The vehicle is assembled from standard parts and sold locally. Electric lighting is standard on the new model, which partially accounts for the price increase.

The 5-tonner is very similar to the 3½-ton model, excepting, of course, that it is heavier.

Knox

New Towing Winch Model a Full Tractor

TRACTORS only are manufactured by the Knox Motors Co., Springfield, Mass., and sold through the Knox Motors Associates. The production of trucks and special fire apparatus was abandoned 2 years ago and for a year the concern made but one model—its Model 35 semi-tractor. Previous to that time Knox tractors were of an older design, having but three wheels, a single one being used in front for steering.

The new design, while retaining the essential features of the Martin patents under which the Knox company is the sole licensee, had four wheels and in other ways more closely followed conventional ideas in motor vehicle engineering. It has an innovation, however, in hydraulic brakes and complete electric equipment.

This model is continued for 1917 practically without change, but a new type, Model 36, has been added. This tractor made its appearance in the spring of 1916. It differs from the other model in that whereas the other is used solely for the hauling of trailers, having a fifth wheel mounted on separate springs to support the front end of a semi-trailer, the new towing tractor has a body and a conventional frame and springs, the body having a capacity of 3 tons. It has a drawbar and a horizontal winch set crosswise at the rear of the body, by dint of which it is able to haul all manner of trailers through practically any condition of road.

The towing winch tractor, as it is called, may be equipped either with wood or steel wheels, shod with rubber tires or with large steel tractor wheels with metal tires on which diagonal steel cleats may be placed. Forward of the body the two tractors are identical.

The Knox product is almost entirely manufactured in the Springfield plant of the company and is sold generally throughout the country, being applied to a great extent by transportation engineers, who not only study and prescribe for the needs of industrials, but contract to do special jobs of hauling for them. The Knox company does not enter into any time payment deals.

Electric lighting and starting, on the two-unit Bijur system, has always been standard on the present design of Knox vehicles, and the manufacturer gives the equipment its indorsement.

A unique feature of the Knox selling plan is that no load capacity rating is given the semi-tractor, since it has been found that by properly proportioning the parts in design the tractor has been made proof against any injury from overloading on trailers, for if a load greater than the tractor is able to pull is put on the trailer, the wheels will slip and so no harm will be done.

The engine of the Knox is located under a hood which extends part-way forward of and part-way back of the Roman front dash. It is a four-cylinder pair-cast engine with overhead valves. Its carbureter is vacuum fed by the Stewart system and it is made without a governor, the size and timing of the valves being relied upon to restrict the speed under load without cutting down the possible speed when running light.

It is said to be practicable to run the Knox tractor at speed when light because of its double spring arrangement, the tractor having its own cantilever rear springs with a constant load, the fifth wheel resting on an entirely separate set of load half-elliptics.

The gearbox of the Knox is bolted to the jackshaft housing, the tractor being double-chain driven. There are the usual two sets of brakes, the foot brakes acting on the jackshaft and being of the contracting-shoe or locomotive type, cooled by cast fan vanes in the drums.

The hand brakes are on the rear wheels and besides being of exceptional size to enable the tractor to check the progress of a heavy trailer, but are operated hydraulically. This method has been employed in order to permit the driver to exert a great leverage on them in order to generate the great pressure needed, without any cumbersome and inconvenient lever arrangements. Instead there is merely a small and short lever which works a pump to force oil from a reservoir into operating cylinders on the brake-arms.

Another feature of especial interest is a differential lock incorporated in the jackshaft which is operated by a pedal which so interlocks with the gearset that it can only be engaged when the gearset is in neutral, after which any gear desired may be meshed. This prevents damage from locking the differential while the vehicle is in motion.

Other oddities in design are the location of the gasoline tank back of the running board, alongside the frame instead of centrally of the chassis and the mounting of the controls on a control board separate from the steering gear.

Koehler

Single 1-Ton Chassis Sole Offering This Year

CONCENTRATION on a single chassis of 1-ton capacity continues to be the policy of the H J. Koehler Motors Corp., such having been its consistent policy since the production of the first Koehler truck. The Koehler company has never built anything else than a 1-ton truck. Formerly it produced a type with a two-cylinder engine under the body, a planetary gearset and double chain final drive. In 1915 the truck was completely redesigned and the present model is practically the same with minor refinements.

The Koehler company has been reorganized, the old name, H. J. Koehler S. G. Co., having been dropped. It absorbed the L. E. Schlotterback Mfg. Co., Newark, N. J., which had acted as factor for several years, in the fall of 1916.

The Koehler has been increased in price from $870 to $895, but is practically unchanged in design, the price increase being necessitated by advances in material prices. The clutch, however, has been changed from the cone type to the dry-disk type. The truck is assembled from standard parts and is sold nationally.

The Koehler factory does not enter into any form of time payments. It manufactures a standard open flareboard express body in standard colors, with which about 60 per cent of its product is equipped.

The Koehler is a conventional type of chassis, with a valve-in-head Beaver block engine in unit with the clutch and gearbox, a cast-case finned-tube radiator and final drive by a Torbensen internal-gear-driven axle.

Krebs

New Line of Standard Types of Chassis Offered

REDESIGNED throughout, the Krebs chassis for 1917 are produced by the Krebs Commercial Car Co., Clyde, O., in three models of 1½, 2 and 3½ tons capacity. A new 5-tonner at $4,000 is shortly to be announced. Last year's four models have been dropped. In the new models several departures have been made from former Krebs practice. The hoods are no longer of the French type, but are now of the more conventional European type, with the radiators in front instead of on the dashes. The type of radiator has been changed from a sheet-metal type with a finned-tube core to one with a cast casing and plain copper tubes. The general aspect of the vehicle has been changed in other ways, wheelbases are longer and the frames hang lower.

The Krebs governor, which has always been the most important feature of the vehicle, is retained. This governor, unlike others, does more than merely limit the maximum speed of the motor. It acts as a controller whose purpose is to maintain the speed of the truck constant at a given setting, this setting being controlled by a controller lever on top of the steering wheel, which takes the place of the usual throttle lever.

When the driver wishes to go at, say, 15 miles per hour, he merely sets his lever in a certain notch and the governor maintains the speed constant so long as the truck runs in a given transmission speed, irrespective of ordinary changes in road condition. If a hill is encountered, the throttle automatically opens on ascending a sufficient amount to maintain the speed, and in coasting it closes so as to limit the speed to that set.

Krebs 1917 prices are really lower than before. The new 1½-tonner sells for $2050. Last year's 1-tonner sold for $2000. The 2-tonner sells for $2375, where the older ones of this size sold for $2450. The 3½-tonner sells for $3250, as against $3100 for the old 3-tonner.

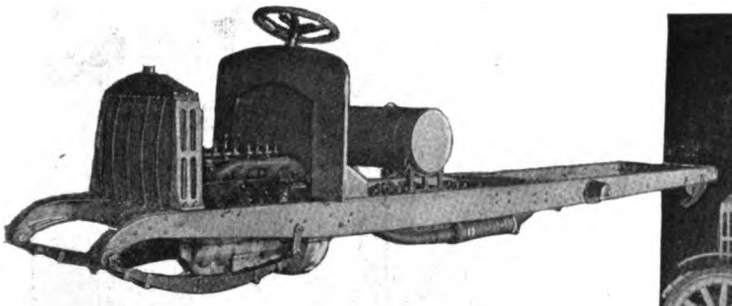
The Krebs company has been manufacturing trucks for several years, having succeeded the old Elmore company, which made two-stroke cars, the Elmore engine having been used in the early Krebs trucks.

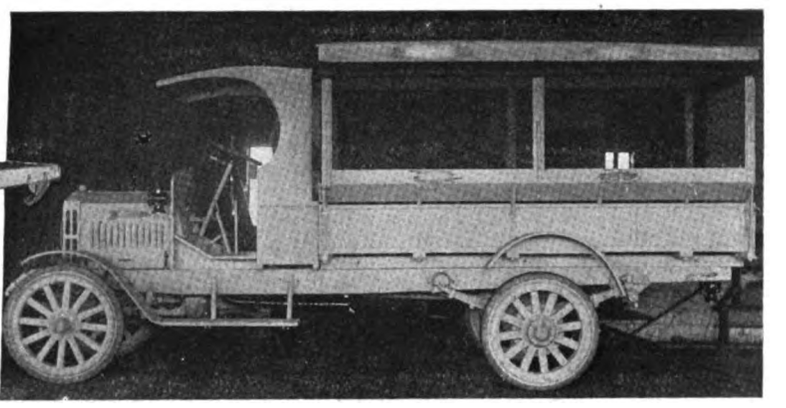
The Krebs truck is mainly assembled, although a few small parts and the governor are made by the Krebs company. The truck has a distribution through New York, Connecticut, Massachusetts, Pennsylvania, Illinois and Michigan, and also is sold abroad, in England as the Clydesdale and in Russia. Very few bodies are handled by the company.

The Krebs company does not indorse the use of electric starting and lighting on solid-tired vehicles, but offers it as extra equipment for those who demand it for an additional charge of $150. It adopts a conservative policy with regard to trailers, tolerating them where good roads and not too steep grades prevail, stating that since it is necessary to provide engines of surplus power to handle the truck on steep grades and bad roads, there is a sufficient margin of power under moderate conditions to permit the use of trailers to absorb the surplus.

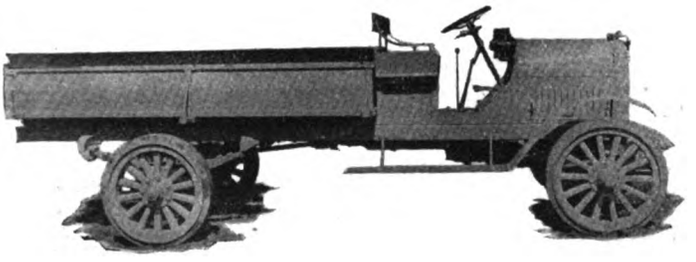
The truck is interesting in

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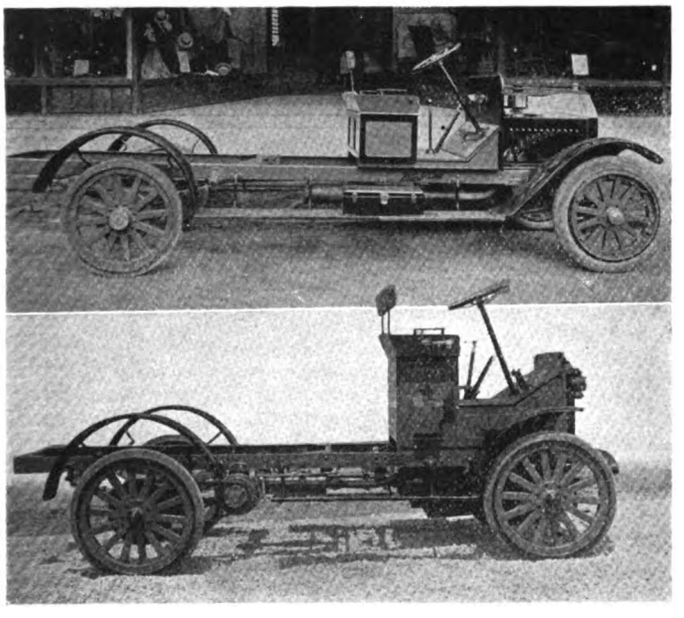
The new Krebs. Left, skeleton chassis of 2-tonner, right the complete vehicle. Note the radiator and its guard



Larrabee 1-tonner with a standard express body



Larrabee 2½-tonner with a standard cab and body

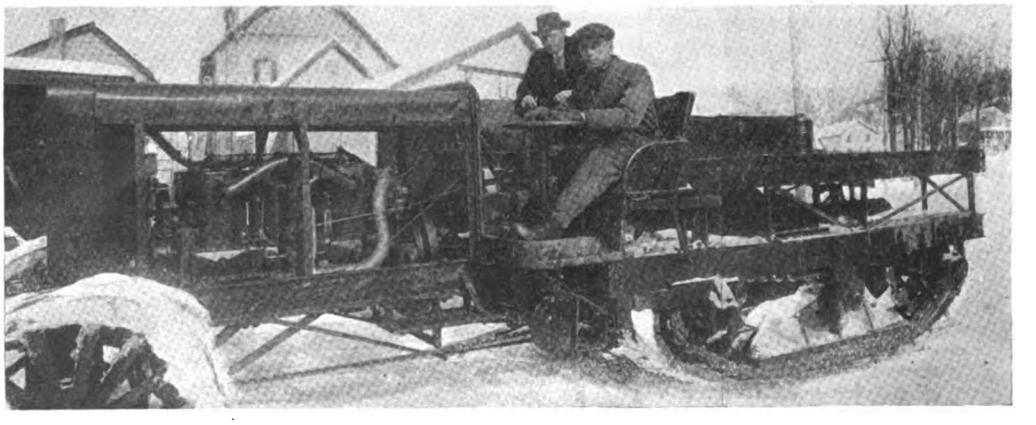


Two types of Little Giant Trucks; above, the worm-driven 1-tonner; below, the 1½-ton chain-driver

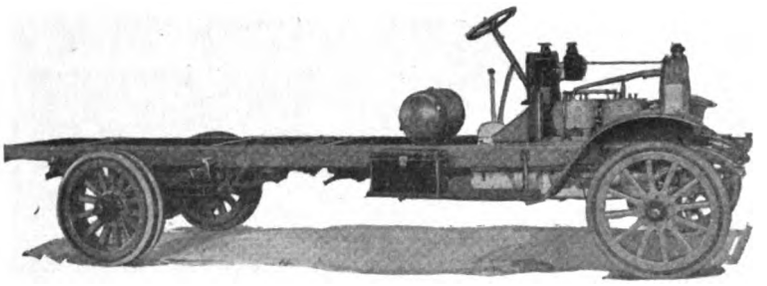


Lange 2½-ton chain-driven truck

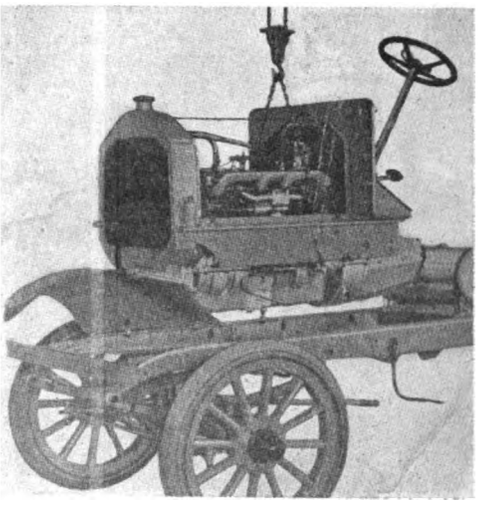
Right, the Lombard track-laying tractor-truck, showing its 75-horsepower engine and lag-beds used instead of rear wheels



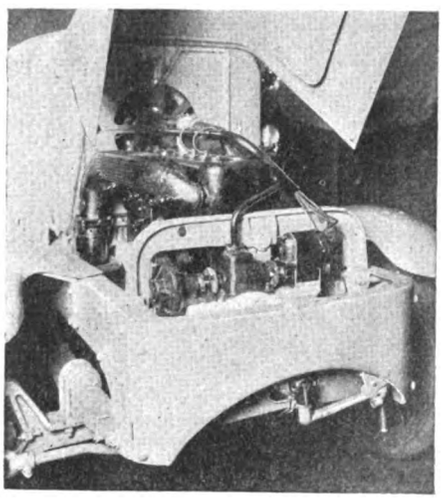
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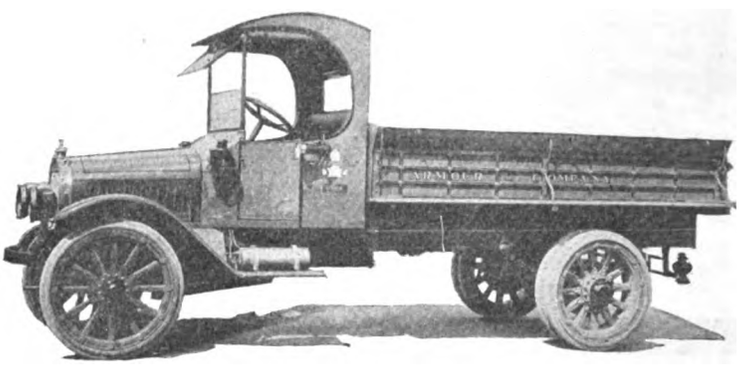
Maccar 2½-ton chassis, stripped; note cylindrical fuel tank



The Mueller demountable power-plant being lifted from a Maccar chassis



Engine of 3½-ton AC model Mack, exposed by raising its French hood—note accessibility



AB model Mack 2-tonner, which is worm-driven



Mack 3½-ton AC type, showing distinctive design of hood and cab and large front bumper

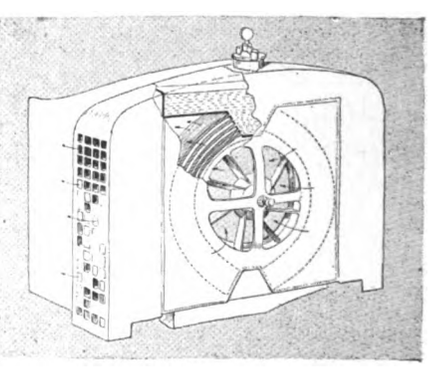
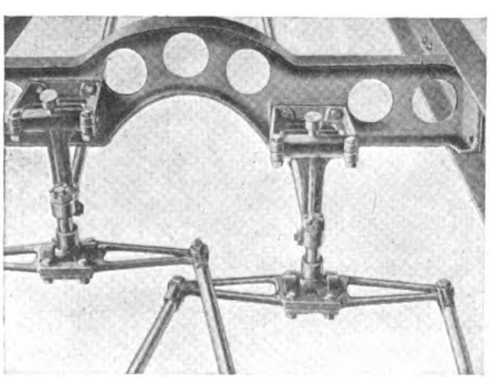
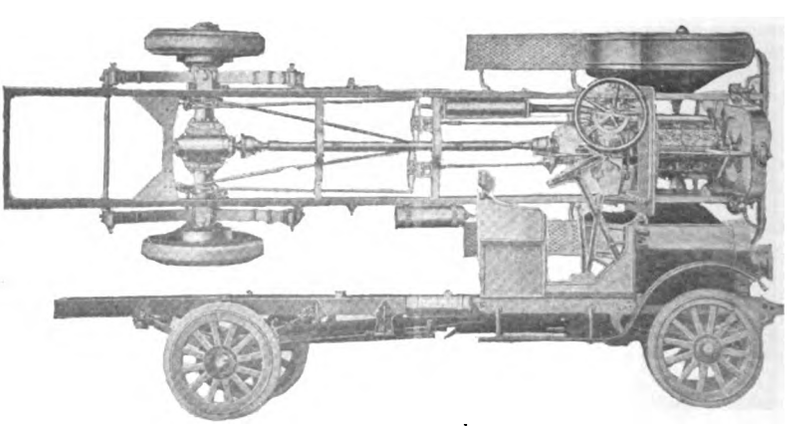


Diagram of Mack ring-type radiator on AC models, showing location of tanks, copper tubes and centrifugal blower



Unique brake eveners on Menominee chassis, and arched cross-member to clear the driveshaft



Top and side views of the chassis of the Model D 2-ton Menominee

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that four-speed gearsets are used on all models, and Hotchkiss drive is featured on each, with the exception of the largest, which has spring torque but radius rods for propulsion.

Lambert

Line Reduced to a Single Model of Chassis

FRICTION drive continues to be the feature of the Lambert commercial chassis, produced by the Buckeye Mfg. Co., Anderson, Ind. The three models of last year have been reduced to one for 1917, this being of 1 ton capacity. This model, while a continuation of the model of the same capacity produced last year, has a 144-in. wheelbase instead of a 120-in. one; it has a new motor of 29 hp., by formula, 4¼ by 5¼, cast singly instead of the 4½ by 5 block-cast one of last year. It has single Remy ignition instead of the dual type formerly used and is equipped with a Pierce centrifugal motor-driven governor. The new vehicle, despite these changes, sells for $100 less than it formerly did, the present price being $1,700.

Lane

New Product in One ¾-Ton Size Is Continued

APPEARING for the first time in 1916, the Lane truck is a standard ¾-tonner, which is continued for 1917 without change. It is an assembled product built by the Lane Motor Truck Co., Kalamazoo, Mich., and sold principally in the State of Michigan. Credit terms are arranged through the Bankers' Commercial Corp., of New York, whose system of motor truck credits is now used by a large number of truck builders.

Practically all Lane chassis are sold with body equipment, and they are regularly equipped with the Gray & Davis lighting system as stock equipment. The Lane has a four-cylinder block motor of 16.92 formula horsepower, driving through a unit-mounted disk-in-oil clutch and selective gearset to a worm-driven rear axle, driving on the Hotchkiss plan.

Lincoln

New Model of 1¼-Ton Capacity Replaces ¾-Tonner

A NEW model of 1¼-ton capacity has replaced the ¾-tonner which the Lincoln Motor Truck Co., Detroit, produced during 1916. The new model is priced at $1,750, is mounted on solid rear tires, has an engine of 19.61 rated horsepower, a cast-case radiator with a plain tubular core, magneto ignition, a monarch governor, vacuum fuel feed and bevel drive. At $100 extra the Delco system of starting, lighting and ignition will be applied.

Lippard-Stewart

Five Chassis Continued, $75 Reduction on ½-Tonner

ONLY in the ½-ton model has the Lippard-Stewart Motor Car Co., Buffalo, made any changes of moment. In this model a new motor of greater power has been installed, the new one being a Wisconsin, the battery system of ignition of last year has been eliminated in favor of the Berling magneto and the price has been reduced from the former $1,000 to $925.

The larger models, which are of ¾, 1, 1½ and 2 tons capacity, are continued with only such minor changes as a change from the zig-zag tube radiator core to the square-tube form, and the removal of the governor from the 1500-lb. model.

The Lippard-Stewart Company occupies a new factory in a different part of Buffalo, where it has increased manufacturing space, having formerly occupied only a part of a factory.

The trucks are assembled from standard parts and sold all over the United States. A down payment of 25 per cent and the balance in negotiable notes are accepted as payment if desired, and about 75 per cent of the product is shipped with bodies.

Electric lighting and starting is fitted to the ½-tonner as stock equipment, and either the Remy or Dyneto system will be applied to the others at an additional cost of $135. The Lippard-Stewart people believe in the use of trailers.

The Lippard-Stewart vehicle is characterized by its French hood, with its radiator on the dash and by the use of worm drive on all models. The larger three of these trucks have cast-case radiators, but in general all are laid out on identical lines. Hotchkiss drive is employed on all.

Lange

Capacities Increased, but Designs Unchanged

PITTSBURGH-made and sold principally in Greater Pittsburgh, the Lange truck for 1917 is virtually a continuation of the 1916 product. An increase in capacity has been effected, however, the 1-tonner being now rated at 1½ tons and the 2-tonner at 2½. This has been accompanied by an increase in price of $100 in each case.

The truck is principally assembled, but the concern is doing more of the work on the minor components. Credit sales are sometimes made, the local business done permitting the factory to keep in close touch with its customers. All bodies on Lange chassis are made to order. Electric starting and lighting is fitted at an extra charge of $200, the Westinghouse system being employed, and trailers, due to the hilly nature of Pittsburgh, are not recommended.

Little Giant

Four Models of Different Type Now Made

TWO radically different types of design are employed in the commercial vehicles built by the Chicago Pneumatic Tool Co., Chicago. These trucks, which are known as the Little Giant, are the outgrowth of the Duntley vehicles produced several years ago. The two types are the now disappearing American type, wherein the engine is placed beneath the cab of the truck, so as to economize wheelbase and therefore make the truck more compact and allow it to turn shorter, and the now popular European type, with the motor under the hood. The former type is double-chain driven and the latter worm driven. Singularly enough, the one new model offered for 1917 is of the American type and is of 1-ton burden.

The only increase in price is in that of the 1½-ton chain-driven model, now $1,500, but formerly $1,450. The new truck sells for $1,400. The other two models are of 1500 lb. and 2 tons capacity, both following the same lines in design.

The Little Giant is an assembled vehicle and is sold throughout this country by branches of the company, which also distribute the compressed-air tools and railway motor cars produced by this concern. Abroad the truck is represented by importers, it being known as the C.P.T. in England.

Credit sales are arranged by requiring a third down and the balance in eleven equal monthly payments. About half of the Little Giant output is equipped with a standard express body, the rest being sold stripped. Electric lighting and starting is only recommended where pneumatic tires are used in front, although the company makes provision for and encourages the use of light trailers.

Larrabee

Additional Model Added, Now Three Chassis in All

AFTER only little more than a year in the business, the Larrabee-Deyo Motor Truck Co., Binghamton, N. Y., is producing a third model for 1917, this one being smaller than the first ones —of 1-ton capacity. Prices on the larger models have been increased, but they have been improved by the use of a heavier frame, a lower body position and the addition of the Gray & Davis electric lighting, starting and ignition system as stock equipment. The heavier models are of 1½ and 2½ tons capacity.

This make is assembled and its maker recommends the use of trailers as an effective means of preventing overloading of the chassis proper.

The larger models are characterized by the use of cast-tank radiators, but the new 1-tonner has a sheet-metal one. All have unit powerplants, worm drive and spring torque and propulsion.

Lombard

Track-Laying Truck for Strenuous Service

TRACTION by crawler belts is the feature of the Lombard tractor-truck, manufactured by the Lombard Tractor Co., Waterville, Me., and sold by the Lombard Auto Tractor-Truck Corp., New York City. The vehicle offered to-day is practically the same as marketed a year ago. It has a capacity in its own body for 5 tons, in addition to which its 75-hp. Model engine gives it power to haul 50- to 60-ton loads on trailers.

The feature, of course, is the lag-bed, which comprises a pair of rocking pedestals, like the runners of a bobsled, around which the endless chain belts pass, chains of rollers serving to separate the two and eliminate friction. This construction presents a flat surface to the road, although the entire lag-bed on each side is free to tilt longitudinally to any angle to allow for road inequalities.

The belts are driven by sprockets fixed to the frame at the front, and run over idler sprockets, similarly mounted, at the rear. These sprockets are at the ends of a worm-driven axle of standard type.

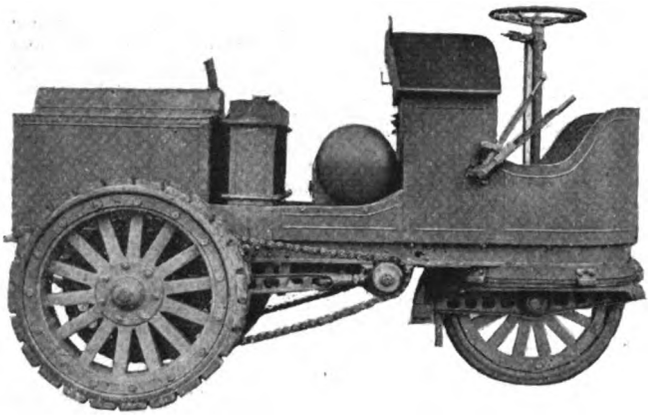
Maccar

New 5½-Tonner Added—Now All Worm-Driven

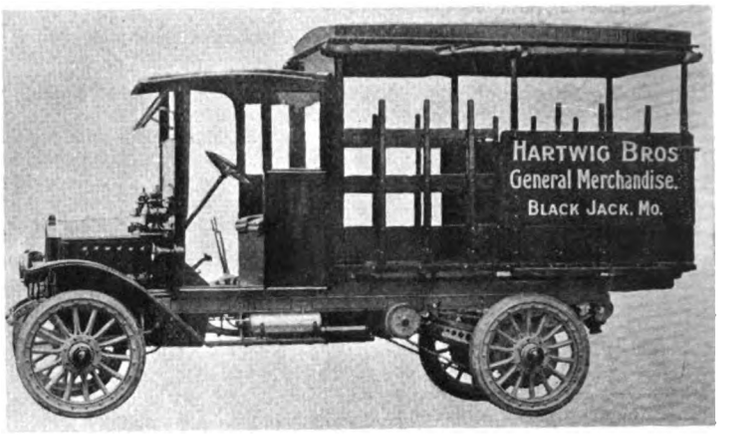
CONTINUATION of the worm-driven models of last season, the addition of a new 5½-tonner and the abandonment of chain drive represents the difference in the offering of the Maccar Co., Scranton, Pa., this year from last. This extends the line to four capacities, although there are but four models as against six last year. This is explained by the fact that three of last year's models were chain-driven and were otherwise practically identical with the worm-driven types of 1, 2 and 3½ tons capacity. The 3½-tonner is essentially unchanged from last year, but the 1-tonner has had its capacity increased to 1½ tons and the 2-tonner to 2½ tons.

Retention of the Mueller demountable unit powerplant serves as an indorsement of this exclusive feature on the experience of over a year. The Mueller powerplant comprises the engine with its unit-mounted clutch and gearbox, the spring-mounted radiator, the steering gear column and hand wheel, the dash, levers, toe-boards and pedals, all mounted on an independent subframe which telescopes vertically into the main-frame.

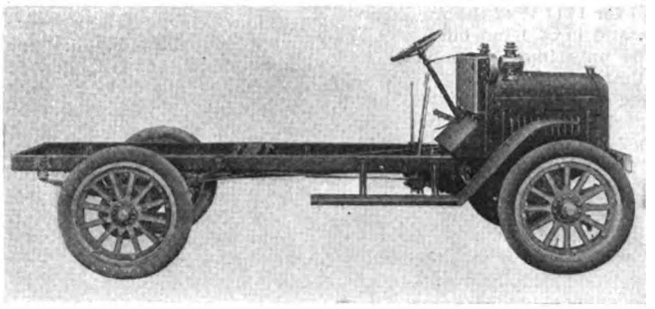
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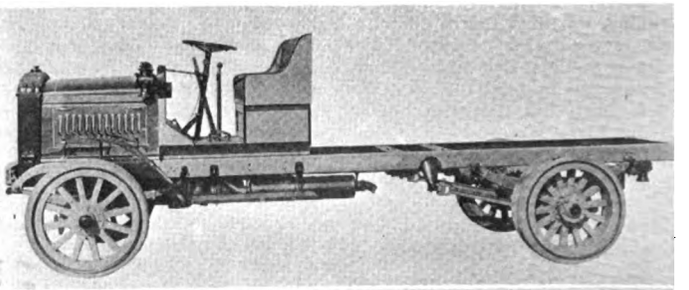
Three-wheeled type of Mercury-Bulley tractor, showing engine at extreme rear and Roman dash

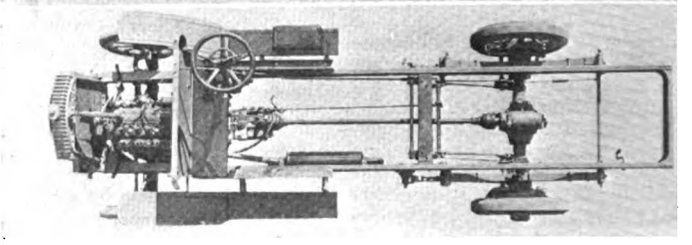


The Moon chain-driven 1½-tonner with a special furniture body for a Missouri firm



New Moreland ¾-ton model on pneumatic tires. Note fuel tank on dash





Side and top views of typical Moreland chassis. Note universal at front end of the radius-rods and single tubular driveshaft. In the lower view, to the left of the engine, looking forward, is the Moreland Gasifier, which enables this California truck to operate on distillate fuel



The 2-ton Niles chassis equipped with a steel dumping body, arranged with an unusual type of hand dumping hoist



Nelson & LeMoon trucks. To the left, the 1-ton model, and, to the right, the 5-tonner, showing similiarity in design of both

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Six bolts retain this subframe and by removing them and the driveshaft, steering rod, gasoline line and the brake-rods, the entire powerplant may be lifted bodily from the chassis by a bail or chain attached to hooks on the subframe at a point where the unit will balance evenly.

In the event of repairs being necessary, removal of the disabled powerplant and substitution of one in good repair permits the truck to remain in use with the loss of very little time. It is considered that most of the necessary repairs which consume time will be made on the portions of the chassis included in the Mueller unit, and by maintaining one or more extra powerplants in the service station or in the garage of a fleet owner, loss of service may be minimized.

Although there have been no price reductions on any of the Maccar models, the retention of the same prices while their capacities have been increased amounts to a decrease.

Abandonment of Hotchkiss drive is the most noteworthy change in Maccar design since last year, for while the springs are still used to take the axle torque, radius rods are used for propulsion.

The Maccar is an assembled product sold mainly in the eastern states and abroad. It is sold under the usual credit scheme, when desired, and will be equipped with a body or sold stripped. Electric lighting and starting are not recommended by the Maccar company. Trailers, on the other hand, are indorsed by the Maccar company and provision for their attachment is made.

Maxwell

New 1-Tonner at $795 and $535 ¼-Ton Size

ENTRY into the commercial vehicle field in earnest is signalled by the announcement at the first of the year by the Maxwell Motor Co., Detroit, of a new 1-ton model at a price approximately half the average for this capacity. This model is to undergo a production of 25,000 in 1917, according to plans, this being made possible by its being constructed in conjunction with the passenger chassis, most of the truck parts being the same as the passenger model, and almost completely manufactured in the Maxwell plant.

In addition to this, the Maxwell company is this year offering its Model 25 passenger chassis as a light delivery vehicle with a load rating of 500 lbs.

The 1-tonner is worm-driven and has the same unit powerplant, radiator, front axle and controls as the smaller chassis.

The truck has Hotchkiss drive and a two-part driveshaft, its middle being supported by a bracket on a frame cross-member and three universals being employed.

Mack

Light Chain-Drivers Added; Two New Tractors

NOW on the market a year, the AC Mack models are continued, with the older AB models practically without change by the International Motor Co., New York City, and five new models have been added.

Three of these are chain-driven AB models, this series being the lighter capacities, 1, 1½ and 2 tons, which formerly were made with worm drive only. The other two new models are tractors of the AC type. The AC series is the newest type produced by this concern, being designed for heavy duty work, such as in the service of contractors and is made only with double-chain drive. Formerly one tractor rated at 15 tons was made, but to this one of 7 and another of 11 tons' rating have been added.

Prices have been increased generally on Mack chassis. In the specifications, published Nov. 15 in this magazine, they were correctly quoted at the same figure as a year before, but since then it has been found necessary to raise them. Prices on worm- and chain-driven models are the same, as before. The 1-tonner has been raised from $2000 to $2150; the 1½-tonner from $2350 to $2500; the 2-tonner, $2700 to $2800; the 3½-tonner, $3400 to $3650; the 5½-tonner, $4000 to $4250, and the 7½-tonner from $4500 to $4600.

The International Motor Co. is the combination of the old Mack Bros. company, the American Saurer company and the Hewitt company. The Mack and Hewitt companies have been in the field for over a decade. The main office is in New York City, but the factories are in Allentown, Pa., and Plainfield, N. J., the Plainfield plant being devoted to the manufacture of Saurer trucks and some of the parts for the Macks. Hewitt trucks are no longer made.

The Mack truck is largely assembled, although a few parts are bought from parts specialists. These trucks have a general sale in this country and abroad. The International company is equipped to build special bodies, but most of its chassis are sold stripped and the superstructures are applied by local body specialists.

The Bosch two-unit electric starting and lighting system will be applied to Mack chassis at an extra charge of $250, if desired. Not only does the International company indorse the use of trailers, but it manufactures tractors, consisting of its AC models with shortened wheelbases and a special form of rocking fifth wheel for the use of semi-trailers.

Small Macks are characterized by conventional design, the firm's own engine being used in this, as in all models. It is pair-cast, rated at 25.6 hp. with valves to the right. Single ignition is used on the small models and dual on the ACs. Features of this engine are the cross-shaft in front which drives the pump and magneto, its lubrication system which is of the splash-pressure type with an auxiliary gravity-feed reservoir cast on the front cylinder block to give a constant head and to keep the oil cooled while running and to heat it in starting in cold weather, helical timing gears, which besides being more quiet than straight spur gears permit the cross-shaft to be driven by a single gear, the centrifugal governor incorporated with the half-time gear and completely inclosed in an oil-tight casing, integral casting of the water and gas inlet manifold and the mounting of a compact instrument board on the back of the rear cylinder block.

The AC motor is similar to the smaller one save that it has a formula rating of 40 hp. and is not in unit with the gearbox. Furthermore, the instrument board is not mounted on the rear cylinder, but instead is in the cowl of the integrally-built built-up cast aluminum radiator and dash.

The core of this radiator is of the ring type, similar to the Solex, having copper tubes arranged in semi-circles about a belt-driven centrifugal blower. On these models the gearbox is integral with the jackshaft.

Another feature of the AC model is its high frame, thus avoiding the necessity of built-up wood staging to prop the body high enough to clear the wheels. With the radiator in the dash, the motor has been inclosed in a French type of hood, so designed as to give the driver an exceptionally clear view of the road immediately in front of the wheels. The gearbox is designed so that the bearings are retained in the upper half, the lower section being a pan, held on by steel straps, readily removable and exposing the entire gearbox from beneath when removed, permitting inspection or repair without disturbing the body or its load.

At the front of the frame is a combination cross-member and bumper which may be easily swung to one side or removed, exposing the entire front end.

In the cabs of Mack trucks individuality and comfort to the driver have been secured. All models have high side doors, those on the AB models sliding longitudinally and those on the ACs, vertically. On the latter types, the space below the floor, back of the steps, is used as a pocket to receive the door. When it is opened it is entirely out of the way and may be left open in running in hot weather if desired. Similarly when the door on the smaller trucks is opened it is out of the way, occupying a pocket at the side of the seat.

Menominee

More Capacities and Greater Range of Sizes

PERPETUATION of its former design in three new models has been the policy of the Menominee Motor Truck Co., Menominee, Mich., in preparing for a new year of business. The new models are all of new capacities, two of them replacing one discontinued size of last year and making the steps between sizes less radical. The third of the new ones is a larger capacity than heretofore produced.

The complete range now comprises ¾, 1, 1½, 2 and 3½-tonners. The ¾-tonner has been increased in price from $1125 to $1295. The new 1-tonner sells for the same $1575, which last year purchased the 1¼-tonner, and the new 1½-ton size sells for $1775. No change has been made in the cost of the 2-tonner, remaining at $2240, and that of the new 3½-ton chassis has been set at $2775.

Mechanical changes comprise the substitution of cushion tires for solids, and worm drive for bevel, on the 1500-pounder, and the use of a cellular radiator core on all models but the big fellow, instead of the zig-zag tube used last year.

Menominees are built on the Northern Peninsula of Michigan, just over the line from the northeast corner of Wisconsin. The Menominee Motor Truck Co. is the successor to the D. F. Poyer Co., Mr. Poyer having withdrawn to take an agency in Los Angeles. The vehicle's sale is principally confined to the central and western states.

Mechanically, these vehicles are distinguished in the use of unit powerplants and tubular driveshafts, long tubular radius rods, a driveshaft-driven governor, cross-tree brake eveners, auxiliary spiral helper springs in the rear and pneumatic radiator suspension. The latter comprises hemispherical brackets containing hollow rubber balls and the lamp brackets are also supported from this cushion.

Mercury-Bulley

Small Three- and Four-Wheeled Tractor

CONTINUED with only minor changes, the Mercury-Bulley tractor is made by the Mercury Mfg. Co., Chicago. It is in two models, which are identical except that one has three wheels and the other four. The three-wheeler has a single front wheel mounted on a fifth wheel, and has a shorter turning radius than the four-wheeler.

In construction the tractor is odd, having its engine back of the cab and driving by double chains, the jackshaft being in front of the engine. It has a hood whose ridge-pole is the muffler. The cab has a Roman dash of sheet steel.

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Metz

Adds New 1-Tonner with Novel Rear Axle

ADDITION of a new 1-ton model to its line is the feature of the plans of the Metz Co., Waltham, Mass., for 1917. This new model will sell at the startling price of $695 and will be standard in design save for its transmission system. Like all Metz vehicles, it will be friction driven, but in a new manner. The rear axle is of the internal-gear type, with an exposed jackshaft carrying the wheel of the friction set, the disk being carried on a subframe extension torque and propulsive member.

In addition to this the Metz ½-tonner will be continued.

Moon

No Changes in Single 1½-Ton Chassis

PURSUING a policy of let well enough alone, the Jos. W. Moon Buggy Co., St. Louis, Mo., enters the 1917 market without any change in its offering, a single model of 1½-ton size employing standard construction throughout and final drive by double chains.

The Moon is made by a horse vehicle manufacturer who formerly made passenger cars. The passenger car end of the busiher, however, has been handled for several years by a subsidiary corporation in a separate plant. Moon trucks are assembled from standard parts and have a distribution confined to territory within 150 miles of St. Louis.

Sale on time payments is made when a third is paid down and the balance in from eight to ten monthly installments, with the usual security. Several standard body types are built, the Moon company being well equipped to provide bodies of special construction. The Moon company prefers not to apply electric starting and lighting, but will do so for an extra charge. It has no objection to trailers.

Moreland

New ¾- and 5-Tonners in Distillate-Burners

NATIVE sons of California, Moreland trucks, built by the Moreland Motor Truck Co., Los Angeles, Cal., represent the largest production of commercial vehicles by any firm located west of the Rockies. The line now produced is complete, ranging from ¾ to 5 tons. No changes of moment have been made in the line, although prices of all continued models have been advanced. Two new models, of ¾ and 5-ton capacity, have been added.

The 1 and 1½-tonners have been raised $100 each in price; the 2½-tonner, $150, and the 4-tonner, $200. One change of interest has been effected, however, that being that sheet-metal casings have been applied to all but the 1-tonner, whereas last season cast casings were used.

The Moreland is mostly assembled from standard parts, a number of parts, however, being manufactured in the Moreland plant. The distribution is mainly confined to the territory west of the Rockies, but arrangements have been made to export a portion of the product.

Sales on deferred payments are arranged with the requirement of a third down and the rest in monthly payments of 1 year's running, security being in the form of a lease. Electric starting and lighting are discouraged by the Moreland company, although at an extra charge of $75 the Westinghouse lighting system will be installed.

Trailers, however, are thought to be a good thing, and provision is made for them where used.

The outstanding feature of Moreland construction is the use of the Moreland Gasifier, a combination inlet manifold and vaporizer which enables the engine to employ California distillate, a low-gravity and cheap fuel peculiar to that part of the country.

Nelson & LeMoon

Two New Models Added—Rest Continued Unchanged

DESIGN of Nelson & LeMoon trucks has not been changed since a year ago, but two new models which follow the same lines as the three models which are continued have been added. A 1½-tonner was brought out during the year, originally priced at $2000. This price has been reduced to $1950. The other new truck is a 5-tonner, which, like all the rest, is worm-driven. Originally this was priced at $3600, but it has been found necessary to increase this to $4200.

Nelson & LeMoon are local Chicago assemblers. They do business in the Chicago territory exclusively, and extend terms of a third down and the balance in from 6 to 12 months to responsible parties. Only stripped chassis are sold.

If desired, the Westinghouse starting and lighting system will be applied to any of the five models for $125 extra, the company strongly indorsing such equipment. Trailers, however, are not encouraged.

All Nelson & LeMoon models are offered with liberal wheelbase options, to adapt them to a wide variety of work. The concern is also an adherent to wide single tires up to 7 inches width.

Netco

Two 2-tonners, One a Four, the Other a Six

TWO models of the same 2-ton capacity, but differing in their powe[illegible]nt[illegible] are the 1917 offering of the New England Truck Co., Fitchburg, Mass. One of these is a conventional four and the other a six. The four is a continuation from last year with a few mechanical changes and the six is a brand new model. The last year's 1½-ton chassis has been discontinued. The price of the four is the same as last season, $2350, and the six sells for more, of course—$2600.

Changes in the four comprise the substitution of a finned-tube cast-case radiator for the sheet-metal-cased square-tube type of last year; the adoption of the Eisemann magneto, the abandonment of the governor, the substitution of a dry-disk clutch for last year's dry-plate type and an increase in gear-reduction in the rear axle from 7½ to 1 to 8½ to 1.

The New England Truck Co. does principally a local business in the New England states, and the product is assembled from standard parts. Electric starting and lighting equipment of Gray & Davis manufacture is applied at an extra charge of $200, if desired.

Both models are similar save for their power-plants, both of which are of the unit type. The four-cylinder engine is 4⅛ by 5¼, rating by formula 27.2 hp., and the six is 3¾ by 5¼, rating 33.75 hp. Single magneto ignition is used on the four and on the six a dual system comprising the Gray & Davis generator and the storage battery.

Liberal wheelbase options are offered, with 144 inches standard on both models. The trucks are worm-driven, with springs for torque and propulsion.

New York

Single Model With Improvements at Higher Price

MODIFICATIONS in design have been made in the product of Tegetmeier & Reipe, New York City, and the price has been raised $400. Last year the truck cost $1800 and for 1917 its price is $2200. Option of either chain or worm drive was offered in the 1916 model, but only the worm type is used now.

A larger engine is fitted, although of the same type as formerly employed. The cylinders are 4⅛ by 5¼ as against 3¾ by 5¼ last season, the formula rating being increased from 22.5 hp. to 27.2. The hydraulic governor of the firm's own design which was previously used has been replaced by a Pierce centrifugal type, motor-driven.

Changes in the transmission system comprise the substitution of a dry-plate clutch with an individual-clutch gearset, mounted in unit with the engine instead of a cone clutch and an amidships selective sliding gearset.

The position of the controls has been changed, right steer and right lever mounting having given way to the standard left steer and central control.

The New York truck is sold locally to the Metropolitan district.

Niles

Two Chassis Sold Sectionally Direct From Factory

DIRECT distribution of chassis from the factory is the sales policy of the Niles Car & Mfg. Co., Niles, O. It produces two chassis of similar construction, one of 1-ton and the other of 2-ton capacity. They were first brought out in 1916 and are continued for another year without mechanical changes. Since the specifications of these vehicles were published on these pages, Nov. 1, 1916, the price of the 1-tonner has been increased from $1175 to $1275, the 2-tonner remaining at $1875.

The manufacturer of Niles trucks is an old concern which has been making electric railway cars for many years. Its specialty has been interurban equipment, of which it still has a large production. Its new side-line is assembled from standard parts and is sold mainly in Ohio, Pennsylvania, New York, New Jersey and Illinois.

Credit sales are arranged by a form of conditional sales contract of conservative nature. About 75 per cent of the product is shipped from the factory equipped with standard bodies.

Electric lighting and starting and trailers are not indorsed for Nfles chassis and the company is not prepared to furnish equipment of this nature.

Later on in the year the Niles company will add 1½ and 2½-ton models.

The present product is similar in design, the difference between the two chassis being mainly in the size and strength of load-supporting portions. A pressed-steel flexible frame is the foundation of the design. The small model is regularly mounted on pneumatic tires and the larger on solids, with 7-inch singles in the rear.

The engines are similar, the smaller being of 19.61 N. A. C. C. hp. and the larger, 27.2

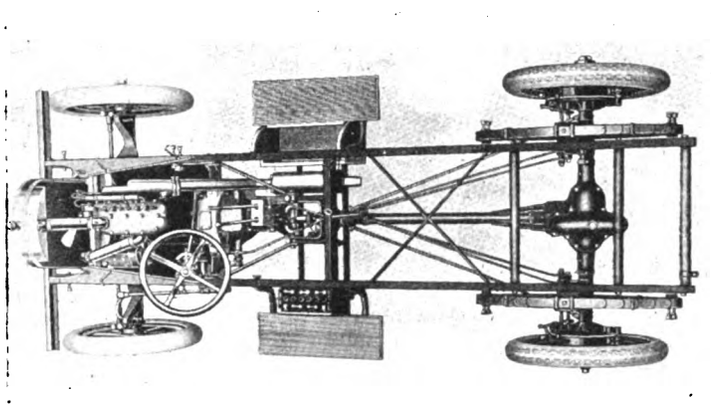
The small model has a dry-disk clutch and a unit gearset mounting with the engine, the larger having a dry-plate clutch and separate gearbox amidships to split the shaft into two short lengths instead of one long one. Both are worm-driven, the smaller on the Hotchkiss principle and the larger with springs for torque and radius rods for propulsion.

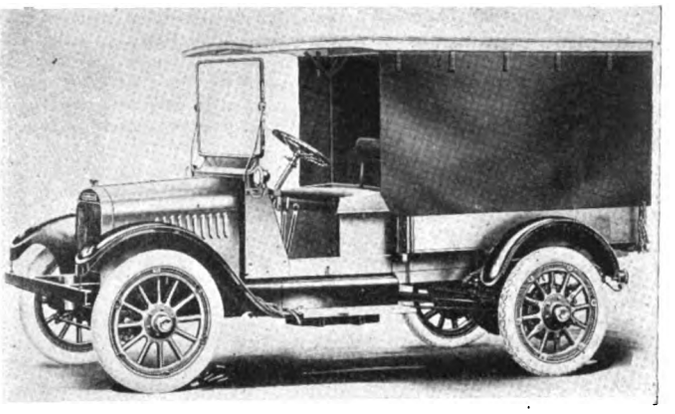
Old Hickory

Only One Model Offered—Price Is Increased

BUT one model of Old Hickory truck is offered this year by the Kentucky Wagon Mfg. Co., Louisville, Ky. The price on this truck has been raised from $785 to $825, this increase occurring early in 1916, but after the 1916 announcement had been made. Only minor refinements have been added to the original design.

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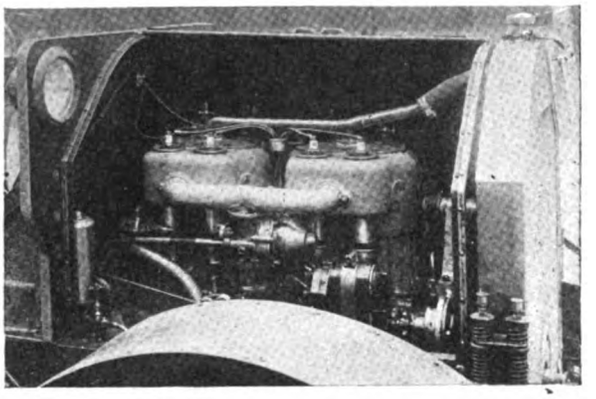




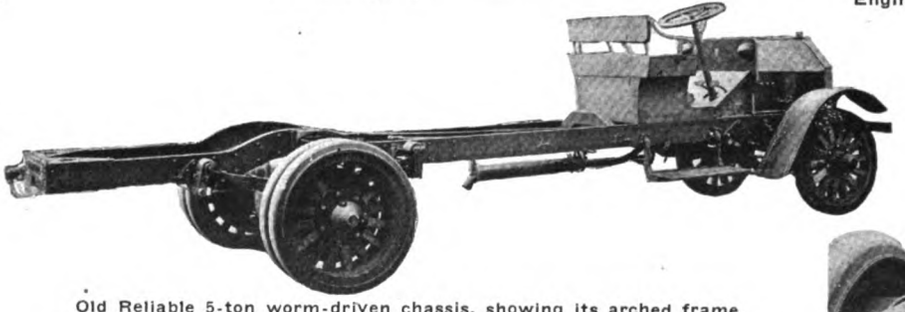
Two views of Old Hickory 1250-lb. delivery vehicle. Left, overhead view of its chassis showing tubular cross-members of frame and torsion tube, and, right, complete with a covered express body.



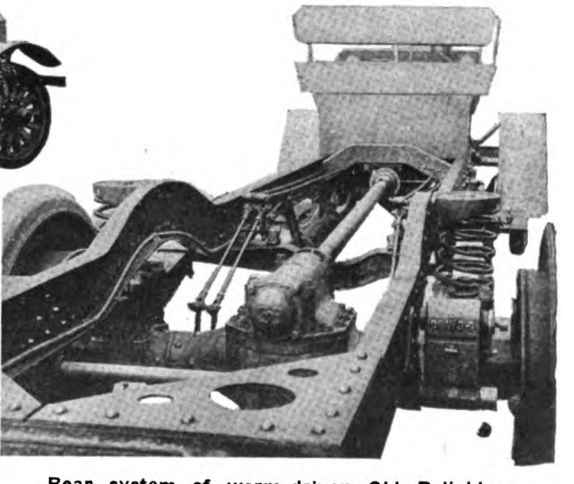
Old Reliable 1½-tonner, the first European-type worm-driven truck made by its manufacturer



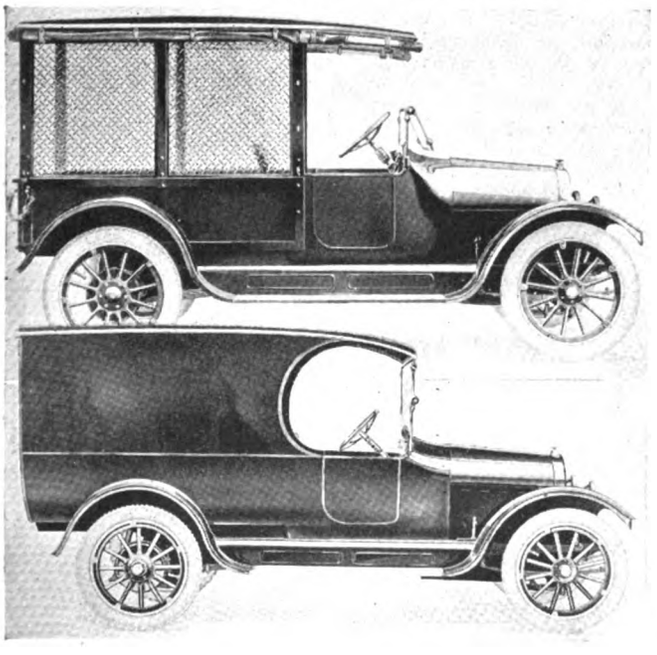
Engine of the new 5-ton Old Reliable worm-driver, showing Duplex governor in place



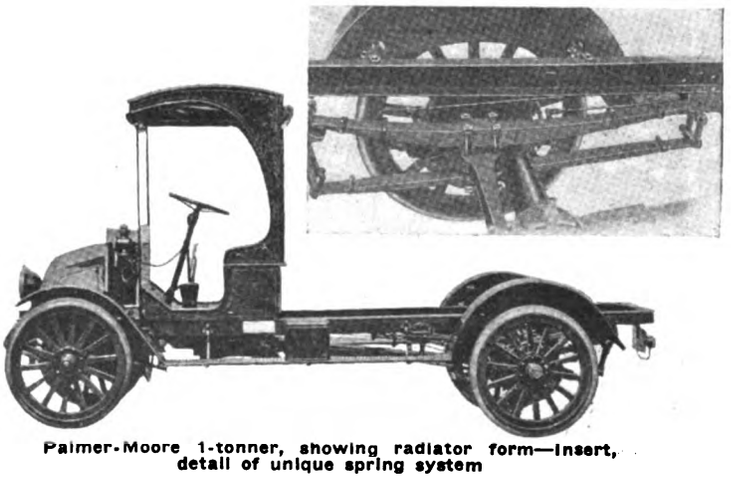
Old Reliable 5-ton worm-driven chassis, showing its arched frame, swung low and extending back to the extreme body limit



Rear system of worm-driven Old Reliable 5-tonner, showing coil helper springs



Two types of Overland delivery chassis. Above, the 800-pounder and, below, the 1200-lb. type



Palmer-Moore 1-tonner, showing radiator form—insert, detail of unique spring system

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The Kentucky company is one of the oldest and largest makers of vehicles in the South and has manufactured electric trucks under the Urban and Old Hickory trade-marks for a number of years. It built an American type 1½-tonner one year, but abandoned it later. The present gasoline vehicle is assembled from standard parts and is sold in the eastern, central and middle-western states.

Sales on credit are not made by the Kentucky company. Due to its facilities for body manufacture, it is able to offer a sufficient variety of standard bodies to attract about 75 per cent of the buyers. The Dyneto single-unit electric lighting and starting system is standard equipment on the Old Hickory vehicle.

In design, the Old Hickory follows standard practice, having a semi-flexible rolled channel frame with an integral front bumper and elliptic rear springs. The unit powerplant comprises an engine which rates at 16.92 hp. with thermo-syphon cooling in connection with a cellular radiator in a sheet-metal casing. It has battery ignition, the Connecticut system being used and bevel final drive.

A torsion tube is yoked at its front end, just abaft the gearbox, thus taking both torque and propulsion, a double leather universal being employed at this point only. The vehicle is mounted on pneumatic tires.

Old Reliable

Three New Models—Older Ones All Continued

GREATLY augmented, the catalog of the Old Reliable Motor Truck Co., Chicago, for 1917 comprises nine models as against last year's five, four new models having been added. These are of 2, 3, 4 and 5 tons capacity, all worm-driven. In addition to these there are the carried-over models of 1½, 2½, 4, 5 and 7 tons capacity, all of which are chain-driven excepting the smaller, which is worm-driven. The 2½-tonner is the same as last year's 2-tonner, and the 7-tonner the same as the former 6-tonner, and the price is the same on the 2½-tonner. The 5 and 7-ton chain-driven models, however, have been increased in price, the 5-tonner from $4250 to $4500 and the 7-ton size from $4500 to $5000.

The larger chain-drivers are of the original Old Reliable design, having their engines under the floor. All of the worm-driven ones are of the conventional European type. The new 5-ton worm model was brought out early in the spring and was priced at $4250.

The Old Reliable company has been identified with Chicago truck manufacture for many years and has always found a sufficient outlet for its production in that locality. The truck is partially manufactured and partially assembled and time payments are arranged with responsible parties. The Old Reliable company has not considered the use of starters on its vehicles, but fits electric lighting as standard equipment on all models.

Mechanical changes have been minor in the continued models. The 7-tonner, in the general strengthening which it has undergone to raise its capacity, has been fitted with a larger motor, a four, 5 1/10 by 5¾, rating 41.62 hp. by formula. The radiator core has been changed from the finned-tube variety to the square-tube type, all models have been fitted with Duplex governors, driven both from the engine and the driving line, the former 6-tonner having been fitted with a loose-ball motor-driven type, the others having none at all.

Overland

New 1200-pounder With Steel Body—Prices Raised

ADDITION of another model of Overland commercial vehicle has been made by the Willys-Overland Co., Toledo. This, unlike the continued 800-pounder, is not mounted on the same chassis as any of the passenger models. The 800-pounder was priced at $750 last January, and in the specifications published by this journal Nov. 1 it was priced at $625, both prices being for the complete vehicle, chassis and body. Since then, however, it has been increased to $675. The 1200-pounder, which was brought out last fall, has been increased to $800 from the original price of $725, complete with body in both cases.

Changes in the design of the 800-pounder which are of moment are that cantilever springs have been applied instead of the three-quarter-elliptic type formerly used, the wheelbase has been reduced from 106 to 104 inches, the tires reduced in size from 33 by 4 to 31 by 4 and an entirely new engine is used, this being the new block-type, 3⅜ by 5, rating 18.21 hp. and having a complete electric starting, lighting and ignition system, the former magneto being abandoned. Also the fuel tank has been moved from the seat to the dash.

The new 1200-pounder has a 106-in. wheelbase, 33 by 4½ tires, a 4⅛ by 4½, 27.2 hp. engine and all-steel construction. This model is a special commercial chassis, with a straight frame, semi-elliptic rear springs. This engine also is of the block type, with a Dixie magneto and a separate two-unit electric lighting and starting system. It drives through a torsion-tube-inclosed shaft to the bevel-driven rear axle.

Overland vehicles are made in one of the largest motor car plants in the world, with an international distribution. Credit sales are arranged through the Guaranty Securities Corp.

Packard

Complete Line Carried Over —5-ton Model Added

CONTINUOUS production of the line of chainless trucks first marketed early in 1915 has marked the policy of the Packard Motor Car Co. for the past 2 years. The 5 and 6-ton models which have been promised for so long are about materialized, the 5-tonner having just come out. No changes in price have been made, but in the 5-tonner may be noted a few departures from previous practice in the present series of Packards, as noted on another page of this issue.

The Packard is manufactured by one of the largest producers of high-grade vehicles in the world, a concern which produced chain-driven trucks for more than a decade previous to complete revolution of its design 2 years ago. Although the principal business of the company is manufacture of twelve-cylinder passenger cars, the truck business is handled by a separate department.

Most of the principal components of the Packard are manufactured in the Packard plant. The vehicles are marketed practically the world over. While the Packard company takes no part in such transactions, dealers employ various methods of time selling. Although the concern is in a position to supply all types of special bodies, most of its chassis are shipped stripped.

The new Packard engines are designed for the application of electric starters and generators, so that the Bijur system is offered as extra equipment at a charge of $180. One minor change has been made in the design of the continued Packard models, this being the abandonment of the hydraulic governor which was used on the 3 and 4-ton models, all models being at present fitted with centrifugal governors.

All of the continued Packards have block motors with valves at the right, the 1, 1½ and 2-ton models having cylinders 4 by 5½ and the 3 and 4-tonners 4½ by 5½, rating 25.6 and 32.4 N. A. C. C. hp. respectively. Centrifugal pump circulation through cellular radiators in sheet-metal casings cool these engines and Dixie magnetos in dual arrangements ignite them. Carbureters of Packard design and manufacture are fed by pressure from tanks beneath the seats.

Drive is through dry-disk clutches and progressive gearsets to the rear axle, the clutch being incased in a special casing bolted to the flywheel bell-housing, the gearset being mounted amidships with a power take-off for auxiliary appliances and the rear axle worm-gear-driven and of the floating type.

Control is by a steering wheel to the left, levers hung outboard to the left, and a control board containing spark and throttle levers, the switches and carbureter adjustment mounted on a separate column from the steering gear. Radius rods and a torque arm are used on the rear system.

Packet

More Capacity, Lower Cost and Lower Reduction

FOR another year, the Packet Motor Truck Co., St. Paul, Minn., continues its light package delivery vehicle. This is the same vehicle which was formerly called the Brasie and was manufactured by the Brasie Motor Car Co. of Minneapolis. Formerly this product was rated at 500 lbs. load capacity and sold for $450 complete with a panel body. To-day it is rated at 600 lbs. and is priced at $325 without the body, which is a reduction. The only mechanical change is that it has a lower gear-ratio. Last year this was 4 to 1 and it is now 4½ to 1.

The design comprises a small pressed-steel frame, a 100-inch wheelbase, 28 by 3 pneumatic motorcycle tires on wood wheels, a 2¾ by 4 four-cylinder block motor, rating 12.08 hp., thermo-syphon cooled through a finned-tube radiator with a sheet-metal casing, and Atwater Kent single battery ignition with automatic advance. It drives by friction to the jackshaft, from which final drive is by double chains.

Palmer

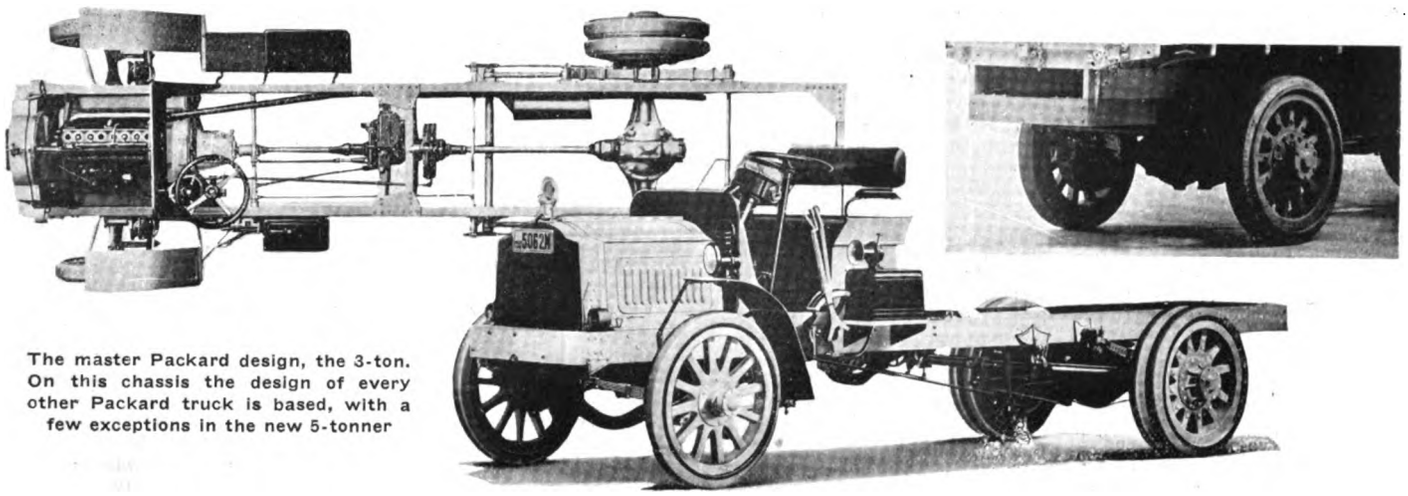
1- and 2-tonners Internal Gear and Worm Driven

ALTERATIONS in the line of the Palmer-Meyer Motor Car Co., St. Louis, have not been made, the same 1-ton internal-gear-driven truck and the worm-driven 2-tonner are continued at increased prices. Since Nov. 1, when this publication contained their specifications, these models have been increased in price, the 1-tonner from $1975 to $2150 and the 2-tonner from $1350 to $1500.

Minor mechanical mutations have been made in the 1-tonner. Its wheelbase has been lengthened from 115½ to 132½, pneumatic tires have been replaced by solids of smaller size, the cellular radiators on both models have given way to the square-tube type of core, both in cast aluminum casings as before and the suction governor with which the 1-tonner was formerly furnished has been abandoned, and none at all is used.

The truck is assembled and is sold mostly locally to St. Louis. Time payments are arranged where the purchaser can pay 25 per cent down and the balance in 12 months. About half of the output of the Palmer-Meyer factory is equipped with bodies. Bosch starting and lighting equipment is supplied only at extra cost.

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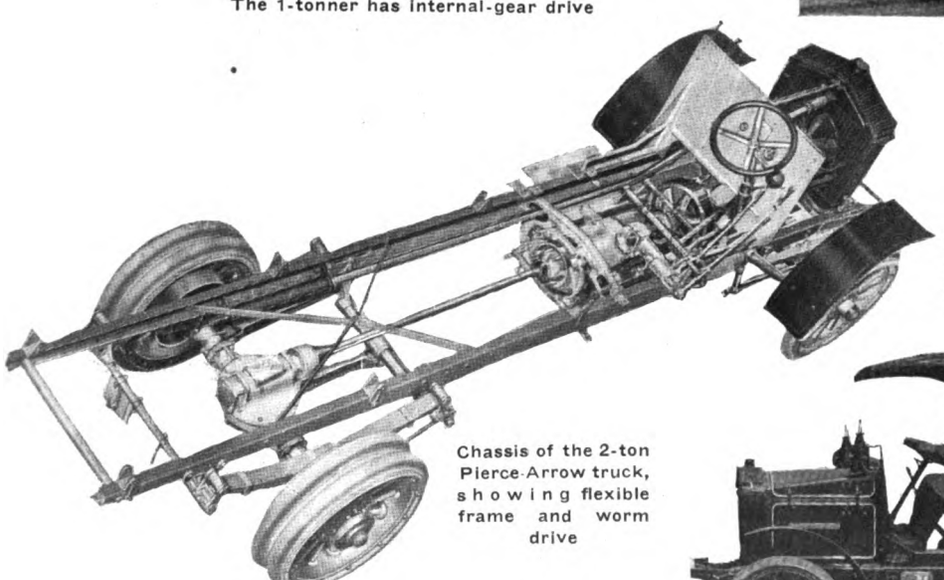
The master Packard design, the 3-ton. On this chassis the design of every other Packard truck is based, with a few exceptions in the new 5-tonner



The Palmer 2-tonner, worm-driven. The 1-tonner has internal-gear drive

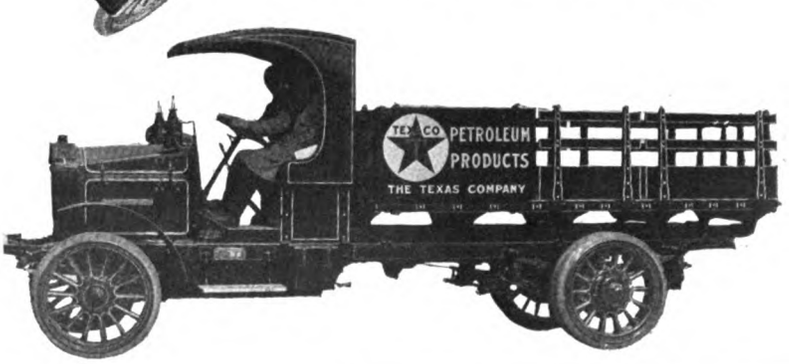


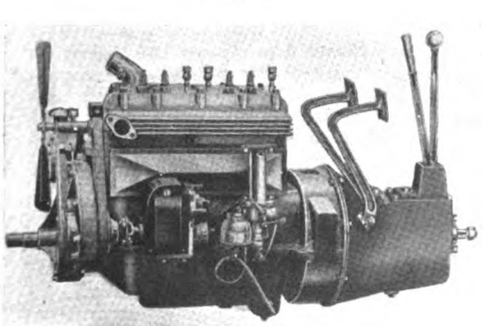
Peerless 4-ton truck, the design of which is typical of all Peerless commercial models

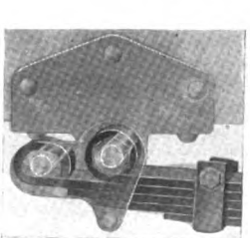


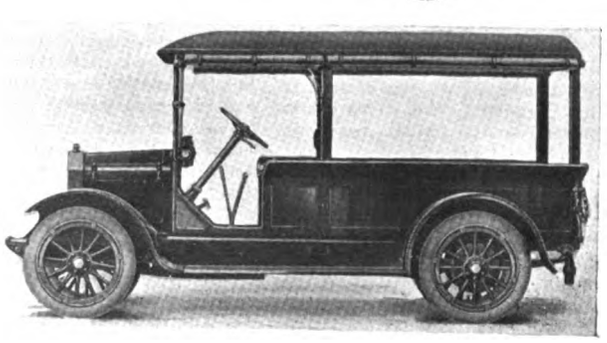
Chassis of the 2-ton Pierce-Arrow truck, showing flexible frame and worm drive

Below, Pierce-Arrow 2-tonner, which is so consistent with the 5-ton design that the two are frequently confused when seen









The Rainier. Left, its power plant; center, spring pinning; right, the complete vehicle with the standard covered express body

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Palmer-Moore

New 2-tonner Added—Unique Mechanical Features

REDUCTION in the price of the 1-ton model and the addition of a 2-tonner constitute the feature of the 1917 plans of the Palmer-Moore Co., Syracuse, N. Y. Two of last year's models are continued with only a minor change or so. The 1-tonner's price has dropped from $1350 to $1075. The new 2-tonner, to be known as Model O, will sell at $1695.

The Palmer-Moore Company has been manufacturing conservatively for several years, the original models being provided with two-stroke air-cooled engines under French hoods. These engines have been abandoned, but the characteristic appearance of the vehicle has been retained. The vehicle is partially assembled and partially manufactured, and is sold throughout the east.

Starting and lighting is not generally applied, but the concern will apply such equipment at extra charge at the purchaser's demand.

The Palmer-Moore employs a standard form of powerplant with the gearset amidships and final drive by internal gears. A torque arm is used, propulsion being through the springs. These springs are of peculiar construction, there being two separate sets of springs, shackled together. One is the usual load spring of the semi-elliptic type. Below it is a secondary spring with opposing leaves so arranged that it puts the upper ones under about 25 lbs. compression. By its different period of vibration and damping action it is said to improve the riding of the vehicle.

The Palmer-Moore radiator is in two parts on either side of the engine, a Cirroco fan being vaned in the flywheel casting to blow a blast of air through it. The radiator core is made up of Rome-Turney finned tubes staggered in their position and inclosed in a built-up cast iron casing. An improved radiator cap with a thimble-like perturbance above it for the water overflow permits the level of water to be carried higher, thus assisting in the thermo-syphon circulation which is relied upon.

Automatic spark advance is attained by an original form of coupling invented and built by the manufacturer. This comprises a cup which takes the drive and a pinion attached to the magneto armature shaft. To the cup are pivoted two segment weights with toothed lips engaging the driven pinion, so that they transmit the drive from the cup to the pinion.

Driving inertia tends to draw these weights inward, but centrifugal force as the engine attains speed forces them to fly outward. In doing so they turn the pinion within the casing, and so advance the timing of the magneto without affecting the position of the breaker, so that the break will always come at the peak of the output curve and the driver is relieved of all responsibility for the position of the spark.

There is an air damper for starting on the carbureter which is controlled by a fork around the starting crankshaft. When the crank is pushed in to engage the engine crankshaft when starting the engine, the damper is closed, a spring opening it as soon as the crank is withdrawn. Hotchkiss drive is not used on the Palmer-Moore, but a torque arm is applied to prevent twisting of the axle, although the springs take propulsion. This is because the internal-gear axle has parallel members which might become misaligned.

Peerless

Five Models Continued Without Changes of Any Kind

PEERLESS motor trucks for 1917 are identical with those for 1916 and comprise models of 2, 3, 4, 5 and 6 tons burden, all similar in design except that the 2-tonner has worm drive while the others have drive by double chains.

The Peerless Motor Car Co., Cleveland, has long been a manufacturer of practically the same type of truck, a heavy-duty, conservative design. It has been engaged largely on war orders of late and has greatly augmented its production on this account. The time has now come when it may again cater to the domestic field. Peerless distribution is international and its product is largely manufactured in one plant.

The concern not only indorses the use of trailers, but provides tractor models for their use. These are made in both semi- and full-tractor forms, in each case consisting of shortened trucks.

An important point in Peerless design is the fact that each of the models, despite their wide disparity in size, employs the same engine, the theory being that as the size of a truck increases, its speed should correspondingly decrease, making the power requirement about uniform throughout the range.

The Peerless engine is a heavy-duty, slow-speed type, of T-head pattern and cast in pairs. It is oiled by simple splash, there being no circulation of oil. It has gear-pump water circulation and dual Remy magneto ignition. Its motor-driven centrifugal governor limits the speed to 925 r.p.m. All but the smaller model, which has a three-speed gearset amidships, have four-speed gearsets incorporated with the jackshafts and cone clutches. Steer and the levers are both to the right.

Electric lighting and starting in most of the standard makes have been investigated by the Peerless company and have its indorsement. It is prepared to furnish them at extra charges.

Pierce-Arrow

Two-model Line Continued Without Alteration

CONSERVATIVE progress by refinement of the basic design rather than radical change in construction characterizes the Pierce-Arrow policy for 1917 as in previous years. The present 5-tonner is substantially the same vehicle with which the Pierce-Arrow company first entered the field, nearly 5 years ago, and the 2-tonner is a close *fac simile* in a smaller edition.

The only change of importance has been the substitution of single ignition with the Eisemann magneto for the dual system formerly employed on the 2-tonner.

The Pierce-Arrow Motor Car Co., Buffalo, N. Y., manufactures practically all of the parts that make up its trucks and their manufacture is carried on principally in separate portions of the plant where Pierce-Arrow cars are made. Distribution is international and a very reserved policy is adhered to in respect of credit sales. The terms granted are gaged entirely by the credit standing of the buyer, the concern finding that it can do much of its business on a cash basis.

A line of standard bodies is offered for work in which there is possibility of standardization, but the bulk of the sales are of stripped chassis to be equipped with special superstructures adapted to users' needs. Electric lighting equipment is installed at extra charge.

The use of trailers was formerly vigorously opposed by Pierce-Arrow engineers, but lately it has tolerated them in a few instances when the conditions were known, and a limited number of special tractors have been delivered, these being shortened-wheelbase chassis with fifth wheels for semi-trailers.

Pierce-Arrow design embodies the employment of heavy-duty T-head and pair-cast slow-speed engines, flexible frame construction with very flat and flexible springs, and worm final drive; the Pierce-Arrow being one of the very earliest American vehicles to employ this drive, and one make which has never employed any other.

One of the characteristic features is the radiator design, consisting of a cast aluminum casing with a vertical finned-tube core. A three-part hood, the sides of which may open separately, is another feature.

Pennsy

Successor to Kosmath, a ½-ton Delivery Car

MADE in a single model and newly placed on the market, the Pennsy 1000-lb. delivery vehicle is the successor to the Kosmath, formerly manufactured in Detroit. It is made by the Pennsy Motors Co., Pittsburgh, and has been on the market since March, 1916. Originally priced at $660, it is now listed at $750, the increase being occasioned by the rises in the cost of materials.

The Kosmath was made for several years in Detroit, and the Pennsy is really a refined model of the same design. It is assembled from standard parts and is sold in the eastern section. The Dyneto system of electric lighting and starting will be applied to it for $75 extra.

It is mounted on pneumatic tires and has an engine of 27.2 hp. Final drive is by bevel gears with spring propulsion and torque.

Pullman

Delivery Bodies on Passenger Chassis Offered

BOWING to the commercial vehicle world for the first time, the Pullman Motor Car Co., York, Pa., adds one more to the long list of ½-ton vehicles which are constructed in that city. The Pullman company has been identified with the passenger car industry for a number of years, and during the past year put out its first delivery model. This is mounted on the same chassis as the touring car and is mainly manufactured in the Pullman plant. It has a general distribution throughout the United States. About 90 per cent of the output so far has been complete with body, the express type complete selling for $750 and the panel model at $775. The Apple starting and lighting system is standard equipment on this model.

Rainier

1000-Pounder, New in 1916, Is Continued

BUILT on truck design, the 1000-pounder Rainier delivery vehicle, made by the Rainier Motor Corp., New York City, is continued for this year without change in design or price. The vehicle is not intended to compete with the low-priced ½-tonners now on the market, but rather with 1500-pounders of recognized makes which carry no greater than 1000-pound loads, but which are purchased because of their high-grade construction.

The Rainier was first offered in August, 1916, and is an assembled product, which is to be marketed over the entire country. It may be purchased on time payments on a sales plan in co-operation with the Guarantee Securities Corp., New York City, in which a cash payment of 25 per cent is required and the balance within a year. It may also be bought on other sales plans as offered by several different concerns.

The Rainier company offers two standard types of bodies with its vehicles. One of these is a panel type and the other an express design. Of the trucks

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sold to date, approximately one-half have been equipped with bodies and the other half furnished as stripped chassis.

Electric starting and lighting is indorsed, but not fitted as standard equipment. A Splitdorf single-unit system is offered at an extra charge of $85.

Nothing radical is found in the Rainier design, but there are several important details which show original thought on the part of the designer. Among these is the novel method of double spring brackets to relieve the springs of some of the excess strain caused by the employment of the Hotchkiss plan of taking both the driving torque and propulsion through the springs. The top leaf of each rear spring follows conventional design, but the second extends beyond the top one and loosely incloses a secondary pin. The third leaf extends beyond the top one, but not as far as the second, thus giving a three-ply support at the spring tips.

The motor is 3¼ by 4¼, of special Rainier design with both manifolds in the cylinder block. It is mounted in a unit with a dry-disk clutch and a three-speed selective gearset, final drive being transmitted to the Timken pressed-steel worm-driven axle by a shaft with two universals. Left steer and center control are employed.

Reo

¾ and 2-Ton Models Are Unchanged

REO trucks, offered in two models, one of ¾-ton capacity and the other a 2-tonner, are unchanged in price or design for this year. They are made by the Reo Motor Car Co., Lansing, Mich., with which the Reo Motor Truck Co. of last year was amalgamated in order to increase the efficiency of both the passenger car and commercial vehicle portions of the business.

The ¾-tonner was new in 1916. It is bevel driven and has its gasoline tank on the dash. The 2-ton unit is chain-driven and is substantially the same vehicle as that produced in 1915.

Both models are manufactured products which are sold throughout the United States and also abroad. The ¾-ton vehicle can be purchased complete with a standard express body with canopy top or as a stripped chassis. Similarly the 2-ton model may be had with one or two types of bodies sold by the Reo company, although the truck is not offered complete with body, as in the case of the smaller vehicle.

The 1500-pound vehicle is furnished with a two-unit electric starting and lighting system as standard equipment.

Although the two models differ as to final drive, each is equipped with a motor of the same size, 4⅛ by 4½, with a rated hp. of 22.70, with the cylinders cast in pairs and the valves at the right and in the head. Each model employs a dry-disk clutch and a three-speed selective gearset mounted amidships. The smaller vehicle has a finned-tube sheet-cased radiator and the 2-tonner a finned-tube type with a distinctive cast case. The feature of this radiator is demountable tube units, which if damaged may be taken out bodily and corks inserted in their places. The 1500-pounder takes the propulsion through the springs and the driving torque through a torque arm.

Republic

Three New Models—All with Internal Gears

THREE new models, added to the Republic line during 1916, are carried over for this year without change, in addition to two models offered at the beginning of 1916. All Republic trucks are internal-gear driven. They are made by the Republic Motor Truck Co., Alma, Mich., and are produced in five models of ¾, 1, 1½, 2 and 3-ton capacity.

The growth of the Republic company has been rapid, the capacity of its plant having been quadrupled during the past year. The company recently built and occupied its own motor factory and radiator plant and also a new factory for the exclusive production of its new 1500-pound Dispatch model, which will comprise about half of its 1917 production.

All Republic models are partly assembled and partly manufactured. The motor of the new 1500-pounder is made complete in the Republic plant, and it is the aim of the company to eventually make its own motors for all models. It makes its own radiator casings at the present time and also the Ruggles governor which is used on all five models.

Republic trucks are sold throughout the United States and also abroad. Many were sold in Australia last year. The 1500-pounder may be had complete with body, while the other units may be purchased with or without bodies, according to the desire of the buyer.

Lighting equipment is furnished on the 1500-pounder as standard and an electric starter may be had at extra cost. Starting and lighting units are furnished on the other four models as extra equipment at additional charges.

All Republic models have pressed steel frames, cast-case radiators, block-cast motors with the valves at the left, Ruggles governors, dry-disk clutches and selective gearsets in unit powerplants, final internal-gear drive with springs on the Hotchkiss principle and left steer and center control. The frames of all models are of the semi-flexible type, except that of the new 1500-pound unit, which has a flexible design.

Solid tires are furnished on all models as standard equipment except on the ¾-tonner. This has Firestone cushion tires as standard, with the option of pneumatics all around. The wheels of the 3-tonner are of cast steel disk type. Single ignition is used on all models with Bosch equipment, the spark advance being fixed except on the 3-tonner, which has hand adjustment.

The Ruggles governor, the design of F. W. Ruggles, the Republic company's president, is of the suction type, and is featured by its extreme simplicity. It was described and illustrated in the Aug. 15, 1916, issue of THE COMMERCIAL VEHICLE.

Riker

Two Models Continued—Prices Raised

RIKER trucks, until March, 1916, known as Locomobiles, are continued for this year without change in design, but with a price increase of $100 on both the 3 and 4-ton models. The change is name was a mark of respect to the president of the Locomobile company, Andrew L. Riker, who also designed the vehicles. Riker trucks, made by the Locomobile Co. of America, Bridgeport, Conn., are offered in but two models of 3 and 4-ton capacity.

This year's models of worm-driven trucks were first brought out in March, 1915. Previous to that time the Locomobile company had built two models with the motors under the floors instead of under hoods as at present, and with final chain drive instead of worm.

Riker trucks are almost entirely manufactured and are sold throughout the United States and also abroad. Large orders for Riker trucks have been filled for foreign governments.

Riker trucks are not offered on any plan of time payments. They are sold mostly as stripped chassis, although the Locomobile company will build special types of bodies on order. Electric starting and lighting equipment is indorsed for use on Riker trucks and is furnished on each model at extra cost. Riker trucks are not intended for use in connection with trailers.

Both Riker models are essentially the same except for heavier rear springs and wider rear tires on the 4-tonner. Each has a pressed steel frame of the rigid type, a 4¼ by 6 motor with the cylinders cast in pairs and the valves opposite. From the motor the drive is taken through a cone clutch and a four speed selective gearset mounted amidships. Radius rods are provided to take the propulsion and torque arms for the driving torque. Right steer and right control are employed. A feature of Riker design is the use of bronze in the motor base and gearbox.

Robinson

Four-Wheel-Drive Unit Undergoing Changes

UNDERGOING changes in design, the Robinson four-wheel-driven truck, made by the Golden West Motors Co., Sacramento, Cal., is still on the market, although details of the changes are not available at this writing. The vehicle, formerly known as the Golden West, was offered at the beginning of last year in one model of 2 tons capacity.

It is an assembled product which has been sold principally in California, its home state.

Last year's model employed four-wheel drive and steer, employing worm gearing for the driving. The motor, of Continental manufacture, 4⅛ by 5¼, was mounted on a subframe high above the main frame in order to clear the worm housing of the front axle. The motor was in a unit with a cone clutch and a three-speed selective gearset. From the gearset the power was transmitted to a main drive-shaft and thence by a silent chain to two other shafts below it, one leading to the front axle and the other to the rear one. Both sets of springs were underslung to give a low frame and load platform height. Left steer was employed with the control levers at the center.

Robinson

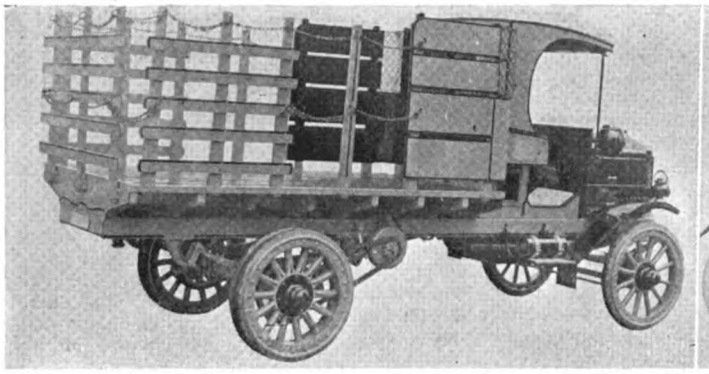
Truck and Tractor for Heavy Haulage

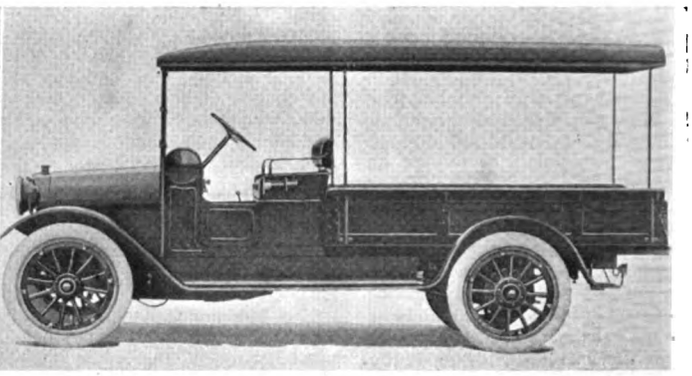
ENTERING the commercial field for the first time, the Robinson Fire Apparatus Mfg. Co., St. Louis, Mo., which heretofore has specialized exclusively on fire apparatus, now offers a four-wheeled tractor with a 120-hp. motor and a motor truck with a motor of 80 hp. Both vehicles are adaptations of the company's fire equipment and are featured by their motors, the larger of which is of the six-cylinder type. Both are manufactured by the Robinson company.

The Robinson company was established in 1871 and is said to have been the first to develop motor-driven fire apparatus.

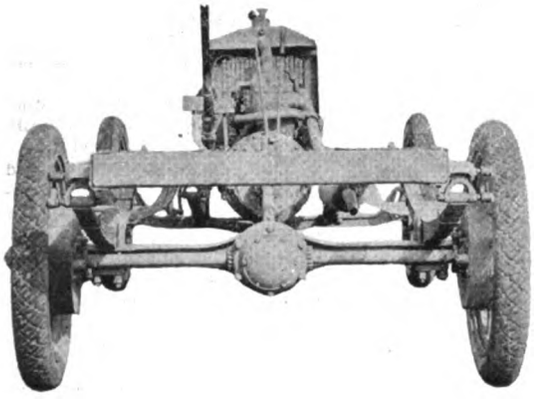
Both the truck and the tractor follow the same general design in construction except that the wheelbase of the tractor is shortened to 110 inches and the vehicle is furnished with a six-cylinder motor instead of a four. Both are chain-driven and employ three-speed individual-clutch gearsets mounted in units with the jackshafts. The frames are of channel steel with hickory fillers. Right steer and right control are used on each model.

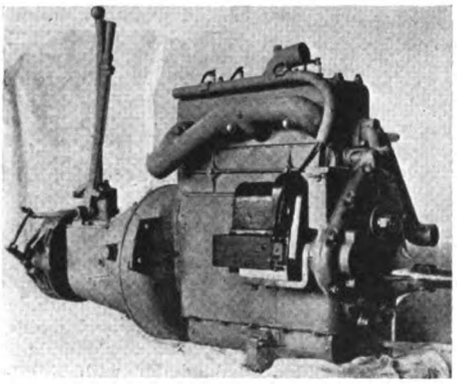
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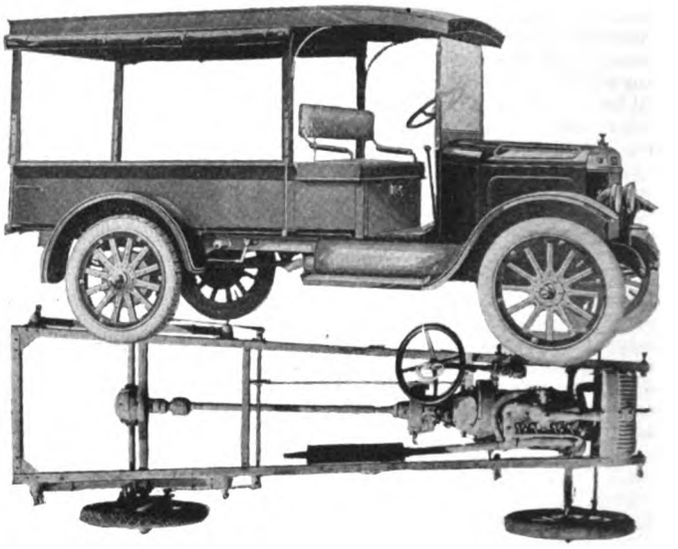


The Reo truck line. Left, the 2-ton chain-driven vehicle and at the right the ¾-tonner, with bevel drive. Note unusual dash on the latter, incorporating the fuel tank

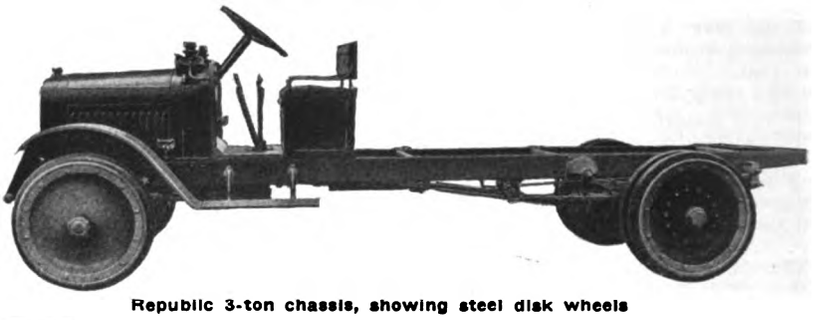




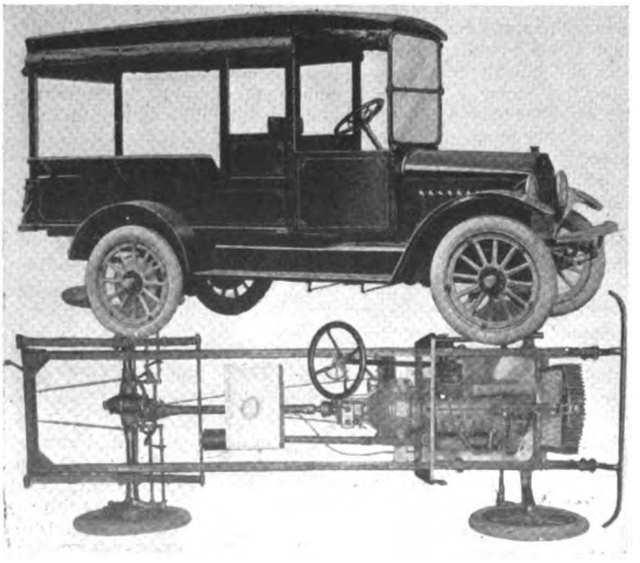
Above, rear view of Republic Dispatch, showing Torbensen axle. Below, the unit power plant of the same chassis, showing combined Bosch magneto and generator

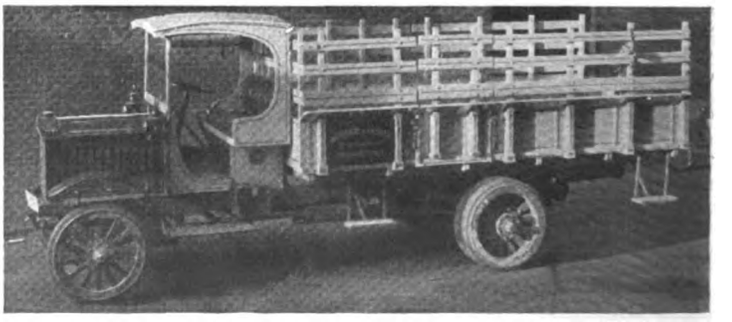


Side and top views of the Republic ¾-ton Dispatch chassis, illustrating its extreme simplicity



Republic 3-ton chassis, showing steel disk wheels





Rush ½-ton delivery vehicle in profile and plan showing truck type of radiator employed

A Riker 4-tonner in service, showing characteristic shape of radiator and louvred hood

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Rocco

½-Tonner New for 1916—Electrically Equipped

FORMERLY the Hannibal, the Rocco ½-tonner is offered by the Rocco Motor Co., Hannibal, Mo., which concern absorbed the Hannibal Motor Car Co. early in March, 1916. In turn, the Hannibal motor company was a subsidiary of the Hannibal Wagon Co., long established in the wagon-building business in the same city.

The new Rocco vehicle will sell at $695, which will include an electric starting and lighting system as standard equipment. The vehicle will be assembled from standard parts at the old Hannibal plant, except for the motor, which will be of the company's own design. The motor will be of the four-cylinder type with a bore of 3½ inches and the valves in the head.

Rowe

Four-Model Worm Line Is Unchanged

CONTINUED from last year without change, Rowe trucks, made by the Rowe Motor Truck Co., Downington, Pa., are offered in four models, all worm driven, of 1, 2, 3 and 5 ton capacity. All have four-speed gearsets of the selective type. The 2, 3 and 5-tonners are substantially the same as the vehicles offered in 1915 except for minor detail changes and the use of four-speed instead of three-speed gearsets.

Rowe trucks are assembled from standard parts and are sold principally in Pennsylvania and in the New England territory.

All four models follow the same general lines, with motors under hoods, square-tube sheet-case radiators, single Bosch ignition with hand spark control, selective gearsets, final worm drive and left steer. The motors of the two smallest models, 3¼ by 5 and 4 by 5, respectively, are cast in block with the valves at the left. Each is in unit with a dry-disk clutch and four-speed gearset. The final drive is by worm with springs doing drive duty.

The motors of the two largest models, 4¼ by 5 on the 3-tonner and 4⅝ by 5½ on the 5-tonner, have their cylinders cast in pairs with the valves opposite.

Royal

Three Models Added—Six in Line

ADDITION of three models, two worm-driven vehicles of 1 and 2½-ton capacity, and a 7-tonner with chain drive, feature the 1917 Royal line, made by the Royal Motor Truck Co., New York City. The 1 and 2½-tonners are the smallest trucks ever offered by the Royal company, its previous vehicles having been 3½ tons or larger in capacity. The models carried over from last year consist of 3½, 5 and 6-tonners, all worm driven, with an option between worm or chain final drive on the 6-ton vehicle.

Royal trucks are an assembled product which is sold principally in New York City and its environs.

All Royal trucks follow the same general design except in the placing of the motors, which are under hoods on the 5 and 6-tonners when supplied with final worm drive and under the seats when chain drive is employed. All models have rolled-channel frames, cellular radiators with cast cases and three-speed individual-clutch type gearsets mounted amidships. All models have right drive and right steer.

The motors of the three smaller models have the cylinders cast in block with the valves at the left and employ dry-plate clutches. The motors of the three larger units have their cylinders cast in pairs with the valves opposite. The clutches are of the wet-disk type. All of the worm-driven models have rear springs arranged on the Hotchkiss plan to take both the propulsion and driving torque. The four smallest models are equipped with electric starting systems as standard fittings.

Rush

Electrically Equipped 1000-Pounder

RUSH 1000-pound delivery vehicles, first offered in the early part of 1916, are continued without change in design or price for this year. The vehicle is made in but one model, and is produced by the Rush Motor Truck Co., Philadelphia, Pa.

The Rush differs from the conventional 1000-pounder in that it follows truck rather than passenger car lines, having a simple chassis lay-out with a special pressed steel frame with integral spring horns and employs a truck type radiator with a cast case.

The main refinement of this year's model as compared with last year's is the inclusion of a starting and lighting unit as standard equipment.

The Rush is principally assembled, although some parts are made. It is sold throughout the United States and may be purchased on installments on a plan in which one-half the cost is paid on order and the balance in equal monthly notes which all expire within 1 year. Two forms of standard bodies are offered in conjunction with the Rush chassis. One is a six-post express type and the other a steel panel design. About 90 per cent of Rush vehicles are sold complete with bodies.

The motor is 3¼ by 5, mounted on a flexible frame and in a unit with a dry-disk clutch and three-speed selective gearset. From the gearset the drive is taken by a shaft with one universal to the bevel-driven axle with springs arranged on the Hotchkiss principle to take both the propulsion and torque.

Sandow

1-Tonner Added to Line of Five Models

SANDOW trucks, made by the Sandow Motor Truck Co., Chicago, are offered in six models, one of which, a 1-tonner, is brand new for 1917. The complete line consists of 1, 1½, 2 and 3-ton vehicles, of which the 2 and 3-tonners are each offered in two models, one worm driven and the other employing side chains.

Sandow vehicles were all chain driven previous to 1916, when the change to worm drive on the models carried over for this year was made.

Sandow trucks are an assembled product which is sold principally within a 200-mile radius of Chicago. They may be purchased on time by a plan which requires the payment of 20 per cent of the price on order and the balance in twelve equal monthly installments. Electric starting and lighting units are furnished as optional equipment.

All Sandow trucks follow the same general design except for final drive. Each has its motor under a conventional hood, a cellular radiator core with a sheet case and a dry-disk clutch and three-speed selective gearset mounted in a unit with the motor. The worm-driven models drive on the Hotchkiss plan. Right steer and center control are employed in each case.

Saurer

Two Models Continued—No Changes Made

SAURER trucks, manufactured in this country by the International Motor Co., New York City, under license of the firm of Adolph Saurer, Arbon, Switzerland, are continued for this year without change in design or price. They are offered in two models of 5 and 6½-tons capacity, and are made at the Plainfield, N. J., plant of the International company.

Saurer trucks have an interesting history, which dates back to 1894, when the development of the vehicle was first begun. Adolph Saurer made his name as the manufacturer of embroidery machinery. He developed the Saurer truck to deliver his delicate machinery over the mountain roads of the Alps. The vehicle was first produced abroad in any quantity in 1900. It was later imported into this country and sold as an imported truck until the International company took over the American manufacturing rights.

Saurer trucks are a manufactured product which is sold nationally. Both models follow the same general design. Each has the same-sized motor 4⅝ by 5½, with a horsepower of 34.28, cylinders cast in pairs and the valves opposite. From the motor the drive is taken through a cone clutch to a four-speed selective gearset incorporated with the jackshaft, the final drive being by double chains. The Saurer truck is one of the few large-sized vehicles which has its gasoline tank suspended beneath the frame at the extreme rear. Right steer and control are employed on each model.

Schleicher

Chain-Driven Models of 3 and 5 Tons

GOTHAM - MADE, Schleicher trucks, produced by the Schleicher Motor Vehicle Co., New York City, are offered for this year in two models of 3 and 5 tons capacity, each double-chain driven.

Schleicher trucks have been made since 1910 and are a partly assembled and partly manufactured product which is sold locally to New York City.

Both follow the same general design with motors under hoods, square-tube, sheet-case radiators, dual-double ignition, cone clutches and four-speed selective gearsets mounted amidships. Right steer and control are adhered to.

Sanford

Three Models—Slight Changes Made

SANFORD trucks, made by the Sanford Motor Truck Co., Syracuse, N. Y., are offered in three models of 1, 1½ and 2-ton capacity. Slight changes have been made since last year, the 1916 1500-pound model being rated at 1-ton and sold at the same price. Last year's 1-ton internal-gear-driven model has been replaced by a chain-driven model of 1½-ton capacity selling at $20 more than the 1-tonner of last year. The 2-ton Sanford, which was last year offered with an option of internal-gear or chain drive and sold at $1910, has been replaced by a 2-tonner with internal-gear drive and a larger motor, the newcomer selling at $2100.

Sanford trucks are an assembled product which is sold throughout the United States and also abroad, principally in England. They may be purchased on time payments by responsible concerns. The Sanford company indorses the use of electric starting and lighting units on its trucks, but so equips them only on special order.

All three models follow the same general lines except for the final drive. Each employs a block-cast motor with the valves at the right, a finned-tube radiator with cast case, a dry-disk clutch and a three-speed selective gearset in unit with the motor.

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Selden

Two New Units Added—Six-Model Line

BRAND new for 1917, a 1-ton internal-gear-driven truck selling at $1385 has been added to the Selden line for this year. The complete offering, made by the Selden Motor Vehicle Co., Rochester, N. Y., comprises 1500-pound and 1-ton worm-driven units, the new internal-gear 1-tonner, a 2-ton internal gear chassis and two additional worm-driven models, one of 2 tons burden and the other of 3½ tons. The 1500-pound worm-driven vehicle was new during 1916 and is carried over from last year with the other models without change in price or design.

Selden trucks are an assembled product sold nationally and in England. They may be purchased on installments. The Selden company provides several forms of standard bodies for its vehicles, but approximately 80 per cent of its trucks are sold as stripped chassis.

Electric starting and lighting equipment is indorsed for use on Selden trucks, although such equipment is only furnished at an extra charge. Provisions are made on Selden trucks for use in connection with trailers.

Except for the final drive, all Selden models follow the same general design. They have their motors under conventional hoods, pressed steel frames of the flexible type, square-tube radiator cores with sheet cases, except the 3½-tonner, which has a cast case, and unit powerplants with dry-disk clutches and selective gearsets. The gearset on the 3½-tonner has four speeds, the others three speeds.

Right steer and center control are furnished on all models, with an option of left steer on the two 2-tonners. The springs of all models except the 3½-tonner are designed to take both the driving torque and propulsion. The 3½-ton model has radius rods for propulsion.

Service

Six Models, All with Slight Changes

EVERY model of Service trucks, made by the Service Motor Truck Co., Wabash, Ind., has been changed slightly from the design offered last year. This year's line consists of six worm-driven models of 1, 1½, 2, 3½ and, 5-ton models. Two 3½-tonners, one with a larger motor than the other, are produced.

This year's 1-tonner is substantially the same as last year's except that its radiator case is cast instead of sheet metal. This year's 1½-tonner sells at $250 less than last year's. The 1917 2-tonner likewise sells at $250 less than its predecessor.

One of the 1917 3½-tonners is the same as last year's model except that it sells at $250 more. The other 3½-tonner sells at the same price as last year's model, but has a smaller motor.

Last year's chain-driven 5-tonner is replaced by a worm-driven unit of the same capacity, but with a smaller motor.

Service trucks are assembled from standard parts and are sold throughout the United States and abroad. A two-unit Westinghouse starting and lighting equipment may be had on each model at an extra charge varying from $160 to $200.

All Service models follow the same general design in that each model has a pressed steel frame, finned-tube cast-case radiator, single ignition, vacuum gasoline-feed system, amidship gearbox with a dry-plate clutch, selective gearset and final worm drive. The 1-ton model is an exception only in that it has a dry-disk instead of a dry-plate clutch.

The three smallest models have three-speed gearsets and drive through springs on the Hotchkiss principle. The three largest models have four-speed gearsets and are provided with radius rods to take the propulsion, the springs taking the driving torque. Left steer and center control are common to all models.

Steele

Four Chain-Driven Models Continued for 1917

STEELE trucks are the same for 1917 as in 1916, both as regards design and price with the exception that electric lighting units are furnished on each model as stock equipment. The Steele line consists of four chassis, each worm driven. The capacities are 2, 3, 4 and 5 tons.

The Steele truck is the outgrowth of the old Morgan vehicle, built in Worcester, Mass., by the Morgan Motor Truck Co. Mr. Steele, who has been building the trucks for the Morgan company, bought out the latter concern and has since manufactured the trucks for himself and markets them under the Steele name.

All models follow the same general lines and are featured by motors between the seats, steel wheels as standard equipment, side thrust bearings in the rear wheels and the patented Steele engine-speed controller. The latter device short-circuits the magneto when the engine exceeds the speed limit set. Then, as the speed drops below the limit, the contact is closed automatically to again put the magneto in service and start the cylinders firing. The device may be set to produce and maintain any desired motor speed.

Steele trucks are made from parts manufactured in the Steele plant and are sold locally to Worcester. They are not offered on any form of time payments. Bodies are built to order for Steele chassis. Electric starting is not indorsed, but lighting is, and is furnished as standard equipment. Steele trucks are adapted to use with trailers.

All models have rolled-channel frames of the flexible type, wet-disk clutches and three-speed individual-clutch type gearsets mounted in unit with the jackshafts. Right steer and right control are used.

Signal

New 5-Tonner Added and 1½-Ton Altered Unit

ADDING one new model of 5-ton capacity, the Signal line for 1917 consists of five trucks of 1, 1½, 2, 3½ and 5-ton burden. The four models carried over from last year are unchanged except for the 1½-tonner, which has a slightly larger motor and sells for $50 more, the price being $1800 instead of $1750.

Signal trucks are an assembled product sold throughout the United States and also abroad.

All Signal models follow the same design and employ pressed steel frames of the semi-flexible type, finned-tube, cast-case radiators, suction motor governors and unit powerplants comprising dry-disk clutches and three-speed selective gearsets except in the case of the 5-tonner, which has a four-speed gearset mounted amidships. The 1-tonner employs Hotchkiss final drive and the other models have radius rods for the propulsion and take the torque through the springs. Left steer and center control are used on all models.

Sphinx

½-Tonner Is Electrically Equipped

SPHINX delivery vehicles are offered in one model of 1000-pounds capacity by the Sphinx Motor Car Co., York, Pa. The vehicle follows standard design except that it has its gearset on the rear axle and employs quarter-elliptic springs at both front and rear.

The Sphinx is an assembled product which at the present time is sold principally in the Pennsylvania territory. It is equipped with starting and lighting equipment as standard fittings.

The motor, 3¼ by 5, has its cylinders cast in block with the valves to the right and drives through a cone clutch to the three-speed gearset on the rear axle. The driveshaft has one universal and is inclosed by a torsion tube, yoked at its forward end to a forged frame cross-member.

Both sets of brakes are foot-operated, the external ones being interconnected with the clutch pedal and the internal set operated by a ratchet pedal. The front axle is tubular.

Standard

Four Models Unchanged in Design or Price

COMPRISING four models, the Standard line, made by the Standard Motor Truck Co., Detroit, is continued for this year without change in design except for a three-point suspension of the motors. The prices remain the same, although it is possible they will be raised if the prices of materials continue to increase. Two, 3½ and 5-ton worm-driven trucks are produced in addition to a 4-ton chain-driven vehicle.

Standard trucks are mainly an assembled product which is offered for sale in every state of the Union, in Canada, and in the following foreign countries, where the chassis is known as the Seabrook: England, France, Germany, Russia, Austria, Australia, New Zealand, Italy, Spain, Portugal, Denmark and Norway and also Brazil and Cuba.

Standard trucks may be purchased on time payments by a plan in which one-third is paid on delivery and the balance within 9 months. The Standard company also carries a line of stock bodies for its trucks, about 25 per cent of which are sold complete with bodies.

Electric starting and lighting equipment is not indorsed, but will be supplied on demand at extra cost. Provision is made on the chassis for the use of Standard trucks in connection with trailers.

The 2-tonner has a block-cast motor with the valves at the left and drives through a cone clutch and three-speed selective gearset mounted amidships. The other three models have unit powerplants consisting of motors with cylinders cast in pairs with the valves at the left, dry-disk clutches and three-speed selective gearsets.

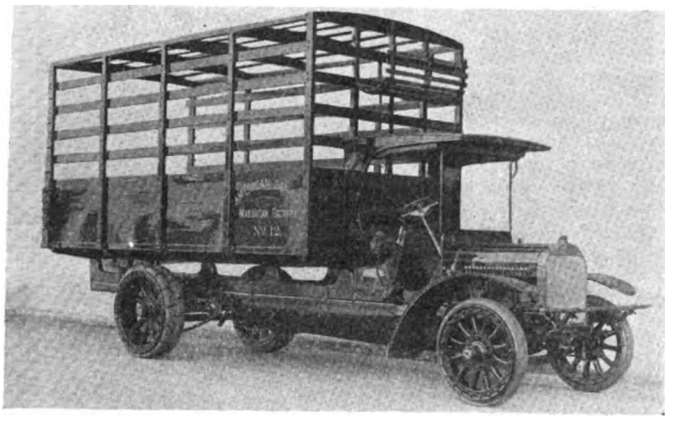
Finned-tube sheet-casing radiators are employed in each case. Radius rods are fitted on all three worm-driven models to take the propulsion.

Stegeman

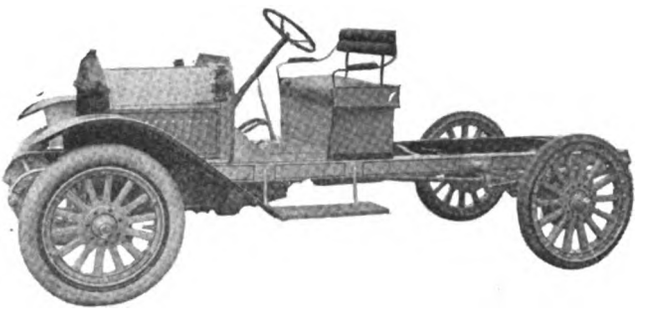
Six Worm-Drivers with Six-Cylinder Motors

SIX-CYLINDER motors are the outstanding characteristic of the Stegeman line which was brought out shortly after January, 1916, and is continued for this year without change in design or price, except for the addition of two brand new worm-driven models of 2 and 3-ton capacity. The standard models carried over are of 1½, 2½, 3½ and 5-ton capacity, each worm driven. In addition to these four chassis, the Stegeman Motor Car Co., Milwaukee, Wis., also offers what are known as country roads specials in the 1½ and 2½-ton sizes. These special models differ from the others of the same capacities in that they have standard gage

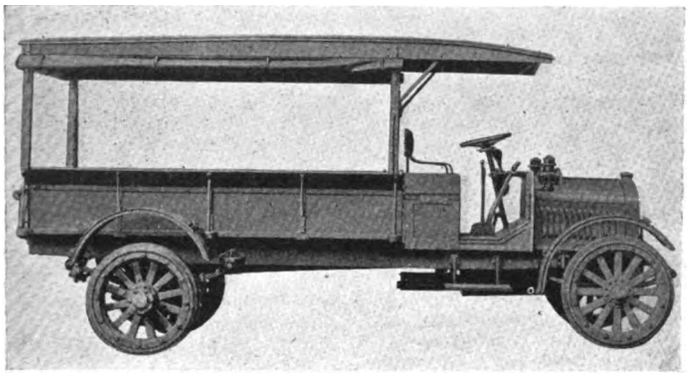
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Five-ton Saurer, showing low suspension and large rear wheels



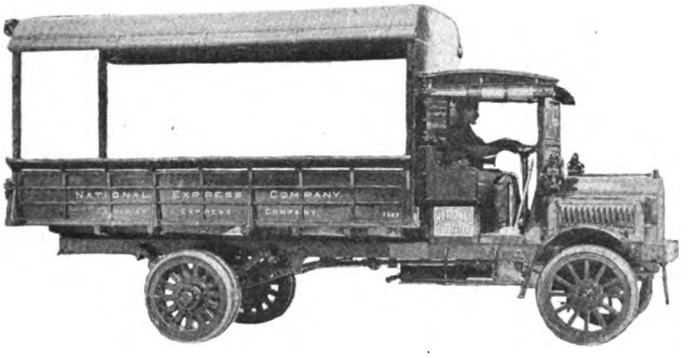
Sanford ¾-ton internal-gear-driven chassis, showing unusual tire equipment



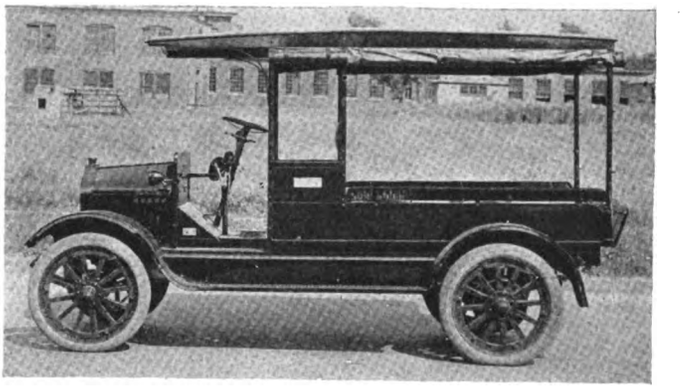
Selden 2-ton worm-driven chassis. An internal-gear-driven one of the same type is manufactured



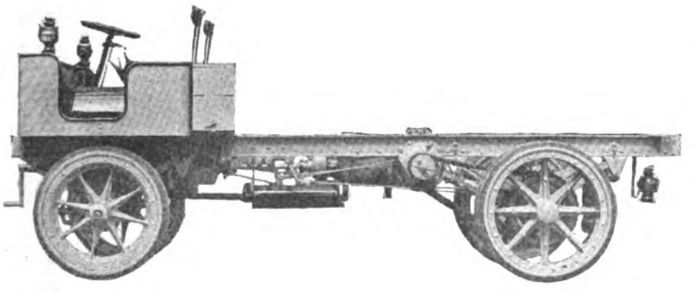
Service worm-driven 3½-tonner with a cab made for winter



Standard 3½-tonner, showing radius rods for propulsion

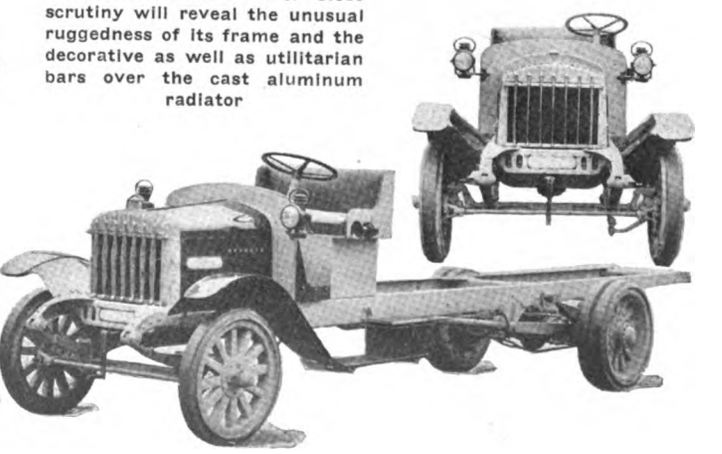


The smallest Selden—¾-ton capacity, mounted on pneumatics



This is a Steele chassis, formerly known as the Morgan. It is chain-driven and has the compromise motor location which gives great load space together with motor accessibility

Below is shown the 3½-ton Signal chassis in two views. Close scrutiny will reveal the unusual ruggedness of its frame and the decorative as well as utilitarian bars over the cast aluminum radiator



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with front and rear wheel tracks the same, 40-inch wheels and low-platform bodies.

Stegeman trucks are assembled mostly from standard parts. They are sold throughout the United States and also abroad, where they are known as the Parker. They may be purchased on a time-payment plan. The Stegeman company carries standard bodies in stock and approximately 50 per cent of its trucks are sold complete with bodies. Electric starting and lighting is indorsed and a Westinghouse two-unit system is furnished as stock equipment on each model. Provision is made by the Stegeman company for the use of its trucks in connection with trailers.

All models follow the same general lines and employ pressed steel frames of the flexible type, unit powerplants with dry-disk clutches and three-speed selective gearsets. Final worm-drive is used on each model, with the rear springs taking both the torque and the propulsion. A departure in the spring system is the placing of the shackles at the front of the rear ones so that the propulsion is a pull on the rear half rather than a push on the front section.

Sterling

Four-Model Line—Two New Designs

ADDING 5 and 7-ton models with their motors under conventional hoods, dropping its 1500-pound model and replacing its 2-tonner by a 2½-ton truck, the Sterling Motor Truck Co., Milwaukee, Wis., offers four units for 1917. The line consists of worm-drivers of 2½, 3½ and 5-ton capacity and a 7-ton chain-driven chassis. The 1917 2½-tonner is substantially the same as last year's 2-tonner except that it has a larger motor. It sells at the same price. The price of the 7-ton unit has been increased $500, from $4850 to $5250, as reported in the last issue of THE COMMERCIAL VEHICLE. It is expected that the prices of the other models will also be increased.

Sterling trucks are an assembled product, which is sold in every state of the Union with the exception of the Dakotas, Oklahoma and Arkansas. They are also sold in all countries of Europe except Germany, Holland and Denmark.

Sterling trucks are sold on time payments with an initial deposit of from 20 to 25 per cent and the balance in notes to expire within a maximum period of 1 year. Two types of standard bodies are carried in stock for all four chassis. Approximately 50 per cent. of Sterling trucks are sold with bodies.

Electric lighting is indorsed on Sterling trucks and is furnished as extra equipment at a charge of $35. Electric starters are not indorsed, but will be fitted on demand at extra charges. The Sterling company indorses the use of four-wheeled trailers only.

Sterling trucks are consistently designed, each model employing a finned-tube cast-case radiator, a dry-disk clutch, selective gearset and drive on the Hotchkiss plan. The 7-ton chain-driven model has radius rods for the propulsion. The 2½- and 3½-ton models have unit powerplants and the 5- and 7-ton units have their gearsets amidships. Their shafts are long but large diameter tubes, so that but two universals are used. Their pressed-steel frames are of the flexible type, having tubular cross-members and wood fillers.

Stanley

Two Steam Trucks Are Continued

STEAM powerplants differentiate Stanley trucks from other commercial vehicles now on the market. They are made by the Stanley Motor Carriage Co., Newton, Mass., and are offered in two models of 1500 and 2500 pounds capacity. The price of the 1500-pounder has been increased $225, from $1550 to $1775, and that of the 2500-pounder, $200, from $2000 to $2200. The design of both models remains the same as in 1916, except for the use of a condenser at the front in the position usually occupied by the radiator of a gasoline vehicle.

Stanley trucks, made by the same concern which produces the Stanley passenger cars and in the same plant, are a manufactured product except for axles, steering gears and condensers.

They are sold throughout the United States. The smaller vehicle is sold mainly for light delivery work such as that of laundries, bakeries, undertakers and for ambulance and police patrol work. The larger model is used principally for buses and for service in the mountains.

Stanley vehicles are not offered on any form of time payments. Approximately 25 per cent of Stanley vehicles are sold as stripped chassis and the remainder equipped with standard bodies furnished by the Stanley company.

Both chassis are similar and do not differ greatly in appearance from a gasoline vehicle. The boiler is under a conventional hood with the condenser in front in place of the usual radiator. The engine is incorporated with the rear axle and is supported on wood reaches between the front and rear axles. Final drive is by spur gears through a spur-gear differential.

The boiler is of the fire-tube type, in a cylindrical form and vertically mounted. It is fed from a water tank under the cab floor, the water being heated by a burner of the Bunsen type directly beneath the boiler. The burner is fed from a kerosene tank at the extreme rear, where there is also a small gasoline tank to feed the pilot light which starts the burner. The burner is automatically controlled by the steam pressure.

The engine is of the two-cylinder, single-expansion, double-acting type and has slide valves operated by the Stevenson link-motion as used on locomotives. Control is by a hand throttle and two pedals which serve to vary the length of the valve stroke for various conditions of running.

Stewart

½-tonner Added—Three Models Offered

STEWART trucks, made by the Stewart Motor Corp., Buffalo, N. Y., are offered in three models for this year. One of these, a ½-tonner, was brought out early in 1916. This vehicle and ¾- and 2¼-ton models, all internal-gear driven, are carried over for this year without change in design or price, although it is expected that the prices will be increased.

Stewart trucks for this year, while similar to those of 1916, are radically different from the 1500-pound model offered in 1915, which had bevel drive with a French hood and dash radiator. The Stewart company has also manufactured a passenger car since 1915.

Stewart trucks are an assembled product which is sold principally in New York and the eastern states.

All three models follow the same general design, having pressed steel semi-flexible frames, block-cast motors, finned-tube sheet-case radiators, dry-plate clutches and three-speed selective gearsets in unit powerplants, and internal-gear drive with the propulsion and torque taken through the rear springs.

Electric starting and lighting equipment is furnished on the two larger models at extra cost.

Studebaker

1916 Line Continued—Prices Increased

PRICE changes are the only essential differences in Studebaker commercial vehicles for this year as compared with the 1916 models. Made by the Studebaker Corp., Detroit, they are offered in two models of ½- and 1-ton capacity. The price of the 1,000-pounder has been increased $65, from $785 to $850 and the 1-tonner $100, from $1,100 to $1,200. Aside from several small mechanical refinements, the most important change made in either model is the change of position of the gasoline tank on the ½-tonner from the cowl to the rear and the introduction of a vacuum feed system.

Both models are a manufactured product and each is built on a chassis distinct from the passenger car models made by the same company. Studebaker commercial vehicles are sold in the United States and in practically all foreign countries. They may be purchased on installments by a plan requiring the payment of 25 per cent on order and the balance within 12 months.

The Studebaker company makes several types of standard bodies for both of its chassis but does not manufacture special bodies of any description. Approximately 90 per cent of Studebaker vehicles are sold complete with bodies.

Two-unit electric starting and lighting systems are furnished on both models as standard equipment.

Both models follow the same general lines, having pressed steel frames of the rigid type, block-cast motors, finned-tube sheet-case radiators, cone clutches, three-speed selective gearsets in units with the rear axles and final bevel drive. Radius rods are used for the propulsion and torque arms for the driving torque on both models. Each model also has a gasoline feed system of the vacuum type

Sullivan

Two Models Continued—Prices Increase

EXCEPT for an increase in price of $50 on the 1½-ton chain-driven model, Sullivan trucks, made by the Sullivan Motor Truck Corp., Rochester, N. Y., are the same this year as last. The 1½-tonner is practically the same vehicle as was offered in 1915 but the 2-tonner, a worm-driven model, was first manufactured during 1916.

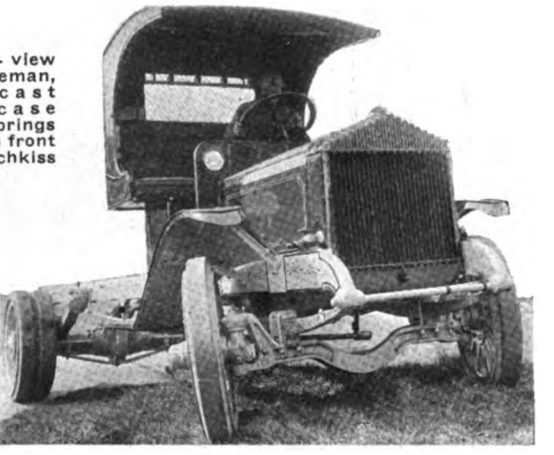
Sullivan trucks are an assembled product which is sold mostly in Rochester and the eastern states. They may be bought on time on a plan requiring 25 per cent cash on order and the balance within 12 months. The Sullivan company also furnishes bodies for its trucks. The cost of the bodies may be included in the time payments. The Sullivan company does not endorse electric starting and lighting for its trucks.

The worm-driven model follows the most advanced truck engineering practice, having a pressed steel semi-flexible frame, finned-tube sheet-case radiator, unit power plant with a dry-disk clutch and three-speed selective gearset, final worm drive and springs which take both the torque and propulsion. The chain-driven model has a rolled-channel semi-flexible frame, block-cast motor, finned-tube radiator with a sheet casing, a cone-clutch and a three-speed selective gearset in a unit with the jackshaft. It has gravity gasoline feed but the worm driver employs a vacuum feed.

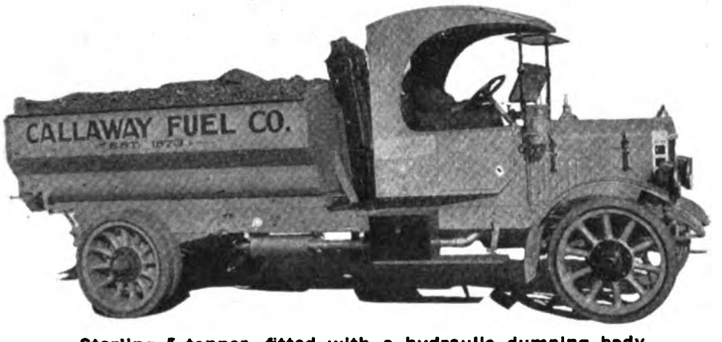
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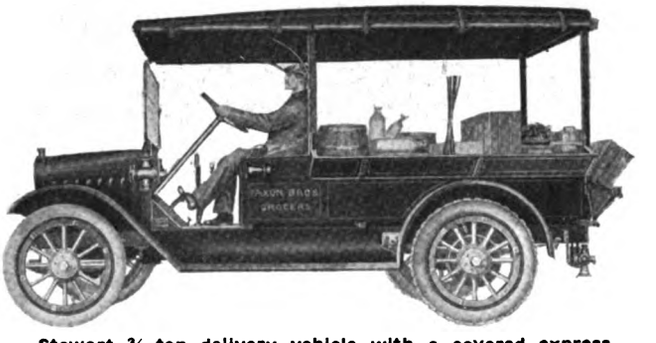
Six-cylinder Stegeman 3½-ton truck, fitted with an elaborate type of furniture van body



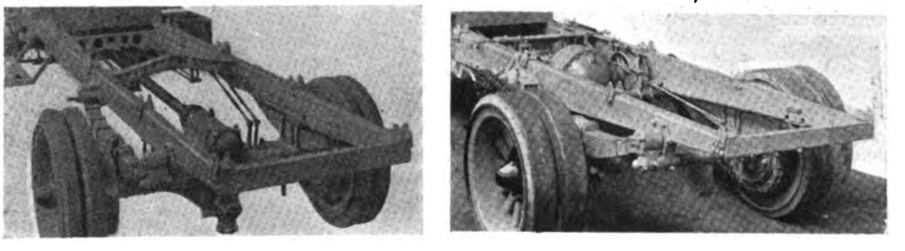
Head-on view of Stegeman, showing cast radiator case and rear springs shackled in front for Hotchkiss drive



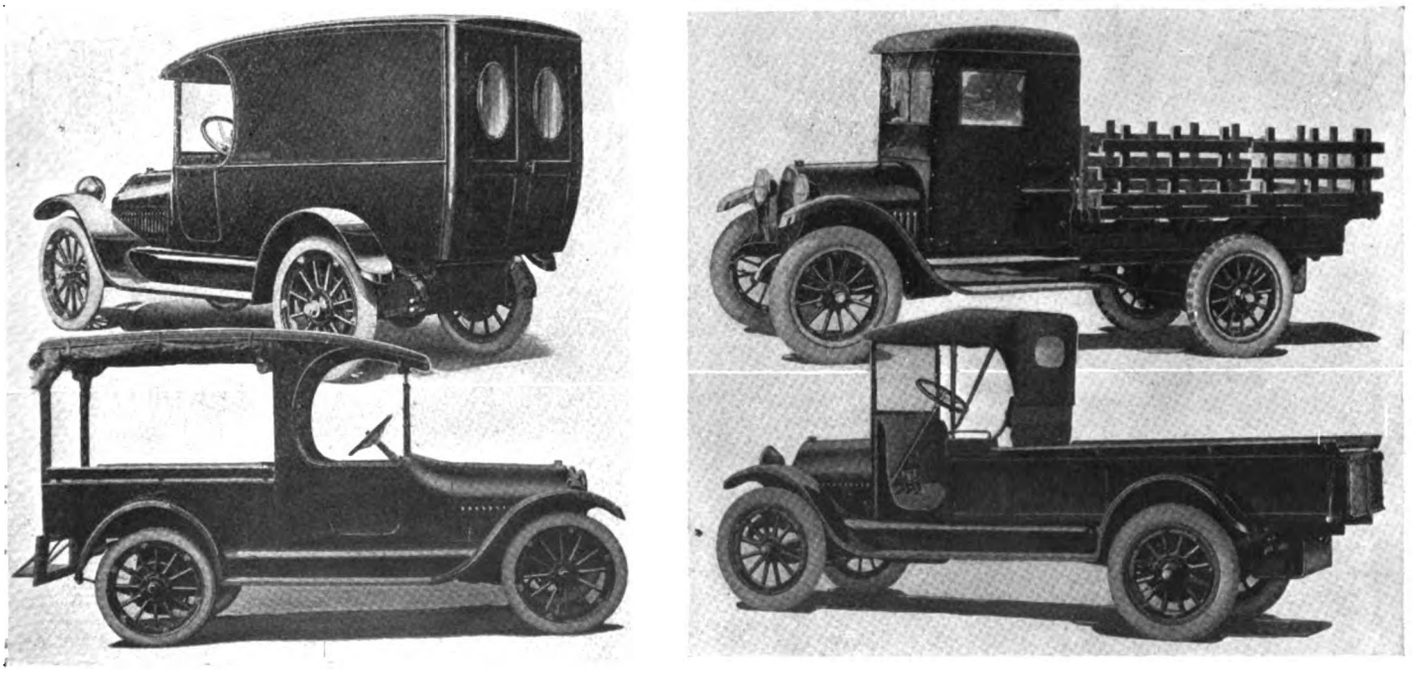
Sterling 5-tonner, fitted with a hydraulic dumping body, showing side doors on cab



Stewart ¾-ton delivery vehicle with a covered express body for grocery delivery

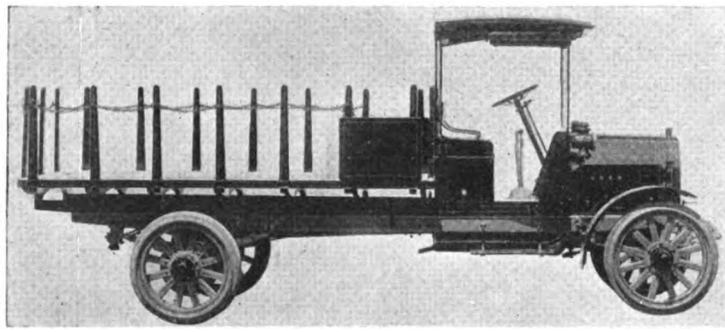


A comparative study of Sterling rear systems. To the left, the 5-tonner with its worm drive, and to the right, the 7-ton type with chain drive, showing similarity otherwise

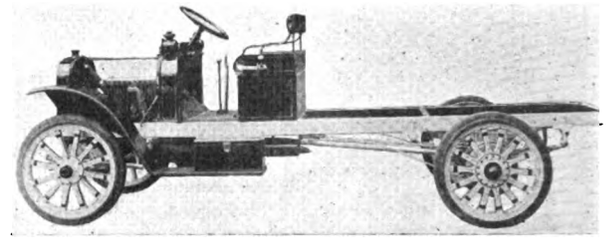


The Studebaker truck models in various poses. Left, the ½-tonner; right, the 1-ton model

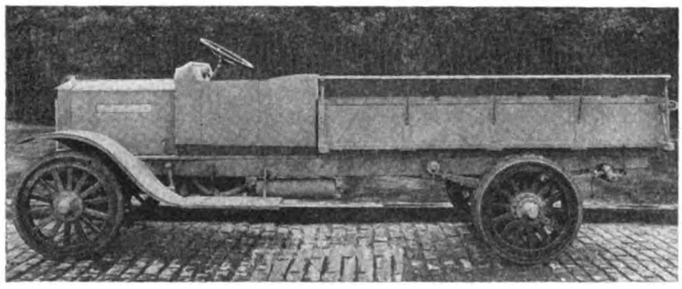
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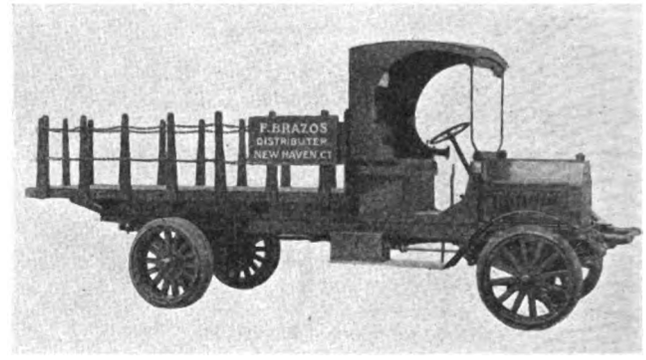
Sullivan 2-tonner, a new model employing worm drive



Superior, a truck from the Sunny South, internal-gear driven

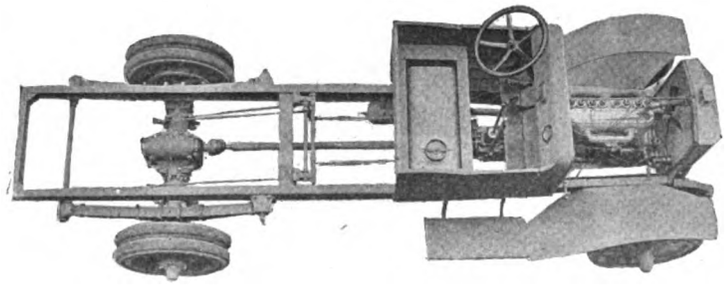


The Thomas, a 2-tonner of advanced practices. Note steel side-door cab, steering wheel rake and exceptional rear spring length

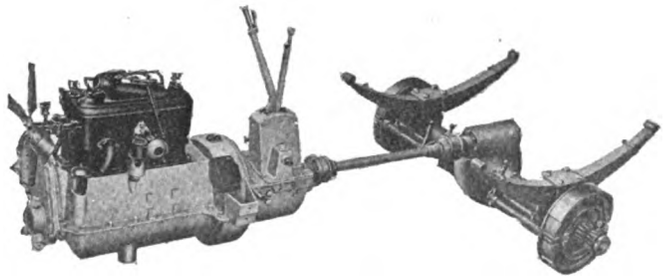


Tiffin, a 2½-ton vehicle with worm drive, fitted with the standard type of staked-platform body and covered driver's cab

These views reveal the inner nature of the Thomas truck and show the aspect of the D-type of radiator. Note Hotchkiss drive and single tubular driveshaft



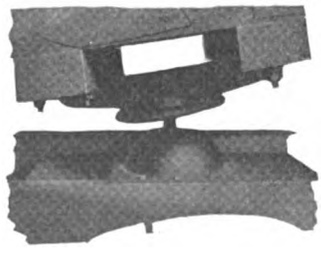




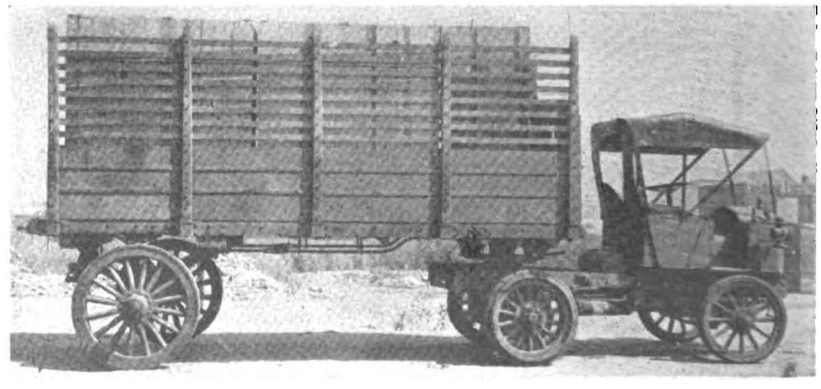
Compact powerplant of the Transport tractor, showing close coupling of powerplant and axle



The United truck on steel wheels. It is a 5-tonner and has a hydraulic dumping body



Above, the cup-and-dome Transport trailer coupling; right, the tractor towing a trailer



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Superior

Internal-gear Models Slightly Changed

OFFERED in the same-sized models as last year, Superior trucks, made by E. G. Willingham's Sons, Atlanta, Ga., remain practically the same except for small changes which include the use of finned-tube instead of cellular radiator cores and radius rods on the 2-ton model to take the propulsion instead of employing the springs for the purpose. Superior trucks are made in but two models, the 2-tonner and a 1-ton vehicle, both of which employ internal gears for the final drive.

The Superior vehicle is one of the few trucks made in the South and is an assembled product sold principally in the southern states. Starting and lighting equipment is not indorsed but may be had at extra cost. Trailers are recommended for use with Superior trucks on which provision is made for such use when the vehicles are so ordered.

Both models follow the same general lines. Each has a pressed steel frame, a block-cast motor with the valves in the head, a dry-disk clutch and a three-speed selective gearset in a unit power plant assembly, a vacuum gasoline-feed system and final internal-gear drive. Pneumatic tires on the front wheels of the 1-tonner are offered at option.

Thomas

2½-ton Worm Driver Unchanged

NEW in 1916, the Thomas 2½-tonner, one of a line of several models to be offered by the Thomas Auto Truck Co., New York City, remains the same for this year. None except the 2½-ton model has been placed on the market as yet. The Thomas truck follows the most advanced truck engineering practice and is characterized by an unusual shape of radiator, bayed in the front in three planes, the center one being straight and the side ones oblique. It has a steel cab with two hinged sidedoors for the protection of the driver.

The Thomas truck is mostly assembled from standard parts and is sold within a radius of 100 miles of New York City. It may be bought on installments by an initial payment of one-third the total cost and the balance in twelve equal monthly payments.

Thomas trucks are sold as stripped chassis only, bodies being supplied on order. Electric lighting is indorsed and such a unit is fitted as standard equipment. Electric starting is not recommended nor fitted but may be furnished at extra cost. Thomas trucks may be used with trailers under favorable conditions, although the Thomas company makes no provision on its trucks for such work.

The truck has a pressed steel frame of the semi-flexible type and employs a 4⅛ by 5½ motor, 27.20 hp., with the cylinders cast in block and the valves at the left. The radiator has a cellular core with a sheet casing. A dry-disk clutch and a three-speed gearset are incorporated with the motor in a unit powerplant assembly. The final drive is by worm with springs which take both the torque and propulsion.

Tiffin

All Models Changed—Two Added

CHANGES in design or price have been made in every one of the seven models of Tiffin trucks, offered by the Tiffin Wagon Co., Tiffin, Ohio. This year's line consists of ¾-, 1-, 1½-, 2½-, 5- and 6-ton trucks, with two distinct models offered in the 2½-ton size. The 1,500-pounder for this year has final internal-gear drive and sells at $1,190. Last year's truck of the same capacity sold at $1,400, with an option of internal-gear drive or chains.

This year's 1-tonner has worm instead of internal-gear drive and sells at $1,450 instead of $1,600, a reduction of $150. The 1½-tonner similarly is offered with worm drive instead of an option of internal gears or chains and sells at $1,790, $10 less than last year's price for the same capacity unit.

Last year's 2-tonner has been dropped and replaced by two 2½-ton trucks, one with worm and the other with chain drive. Both have the same-sized motors as last year's 2-tonner and both cost less. The worm-driven unit sells at $2,500 and the chain-driven vehicle at $2,360, respectively $100 and $240 less than the price of the 2-tonner of 1916. The 5- and 6-ton models sell at the same prices as last year's models but now have worm drive as standard instead of an option between worm and double chain.

Aside from these standard models the Tiffin company also makes motor-driven street flushers, tank trucks and light two-wheeled motor vehicle trailers.

The Tiffin company has been in the wagon-building business for many years and still makes wagons in addition to its large line of motor trucks. The latter are an assembled product which is sold mainly in Ohio and the adjacent states, although the company's municipal equipment is sold all over the country. Tiffin trucks are sold on installments only when the integrity of the purchasers is without question. The vehicles can be had with or without bodies, except in the case of the municipal flusher apparatus, which is always sold complete with tank and pressure pump.

Electric starting and lighting units are indorsed and are furnished as optional equipment on the 5-and 6-tonners for commercial service but as standard on the municipal vehicles.

Except for final drive, Tiffin trucks may be divided into two classes so far as design is concerned. The five small models have many characteristics in common. The 5- and 6-ton models follow the same lines. The two latter trucks have six-cylinder motors with the cylinders cast in threes, dry-plate clutches, three-speed selective gearsets mounted amidships and final worm drive with the driving stresses taken through the springs. These two models have rolled I-beam frames. The five smaller models have pressed steel frames, the three smallest of which are of the flexible type and the other two of the semi-flexible design. The three smallest models also employ unit powerplants with dry-disk clutches and three-speed selective gearsets. The 1,500-pounder is an exception in that it has a cone instead of a dry-disk clutch. All except the 1,500-pounder are equipped with centrifugal governors driven from the motor. All models except the chain-driven 2½-tonner have springs which take both the driving torque and propulsion.

Tower

Worm-driven 2-tonner Still Offered

STILL manufactured but not actively, the Tower truck, made by the Tower Motor Truck Co., Greenville, Mich., is offered in one model of 2-ton capacity with final worm drive.

The vehicle is an assembled product and was first produced late in 1915 for the 1916 market on which it was placed at the especially low figure of $1,600. The price of the 1917 truck is not available at this writing.

Transport

Close-coupled 5-ton Tractor Continued

UNCHANGED except for the use of a four-speed instead of a three-speed gearset, the Transport tractor, made by the Transport Tractor Co., Long Island City, N. Y., is carried over for this year at the same price.

The tractor was designed especially for the motorization of horse wagons and is characterized by its short wheelbase, a steel cab with motor between the seats and a special dome-and-cup device for attaching the forward end of the semi-trailer to the tractor.

The Transport vehicle is assembled from standard parts and is worm driven.

Twin City

Two Double-chain Units Continued

TWIN CITY trucks are offered in two models of 1- and 2-ton capacity, both chain-driven vehicles with their motors under the seats. The 1-tonner has a two-cylinder motor and a planetary gearset. The Twin City trucks are made by the Brasie Motor Car Co., Minneapolis, Minn., which until last year also produced the Brasie Packet, a 600-pound delivery vehicle now called the Packet and made by the Packet Motor Truck Co., St. Paul, Minn.

Twin City trucks are assembled from standard parts and are sold locally to Minneapolis and St. Paul. Each is mounted on the same chassis, the two-cylinder unit being for 1-ton loads and the four-cylinder model for loads of 2 tons.

The two-cylinder motor has 5 by 5 cylinders, cast singly with the valves opposite and drives through a dry-disk clutch and a two-speed planetary gearset in a unit with the jackshaft. That of the four-cylinder has cylinders 3⅛ by 5 with horsepower rating of 19.61.

Union

2½-ton Internal-gear Model New in 1916

PLACED on the market for the first time in 1916, the Union 2½-ton internal-gear-driven truck is continued for this year without change in design or price. The vehicle is made by the Union Motor Truck Co., Bay City, Mich., and is assembled from standard parts. The truck has a steel dash and cowl with the gasoline tank in the latter.

The Union is sold principally in Michigan and Ohio at the present time but will be offered for sale in a larger territory during this year. As yet Union trucks are not sold on any form of time-payment plan.

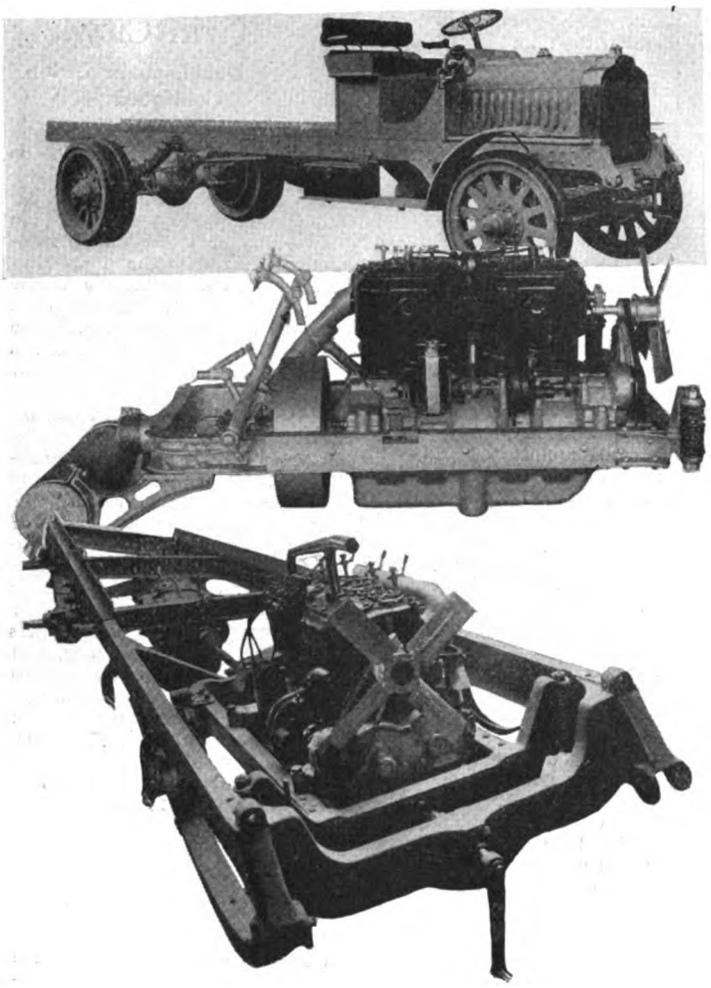
Standard bodies are provided for Union trucks. The Union company does not indorse electric starting and lighting but will furnish such equipment if called for. Provision is made on Union trucks for use with trailers.

United

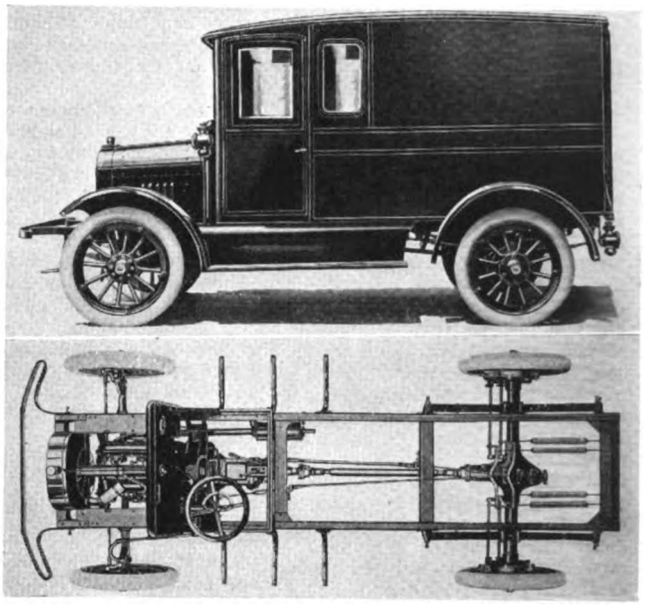
1½-tonner Dropped—New 5-ton Model Added

UNITED trucks, made by the United Motors Co., Grand Rapids, Mich., until early in 1916 known as the United Motor Truck Co., are offered in four models for this year. Last year's 1½-tonner has been dropped, a new 4-tonner brought out and a new 5-tonner with steel wheels desiged to replace last year's model of the same capacity. The complete line consists of 2-, 3½-, 4- and 5-ton trucks, and worm driven. The 2-and 3½-ton mod-

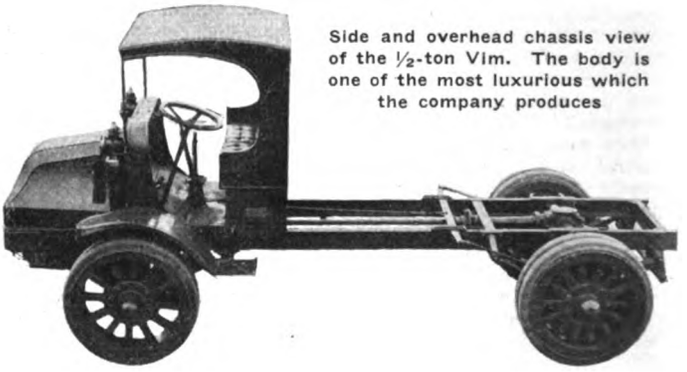
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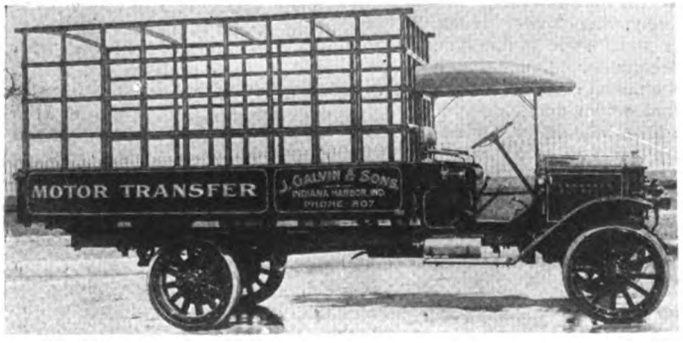


The U. S. 5-tonner, at the top, showing its spring-retained worm axle. At the middle is the unit engine assembly on a spring-mounted subframe. Below, proof of the flexibility of the frame



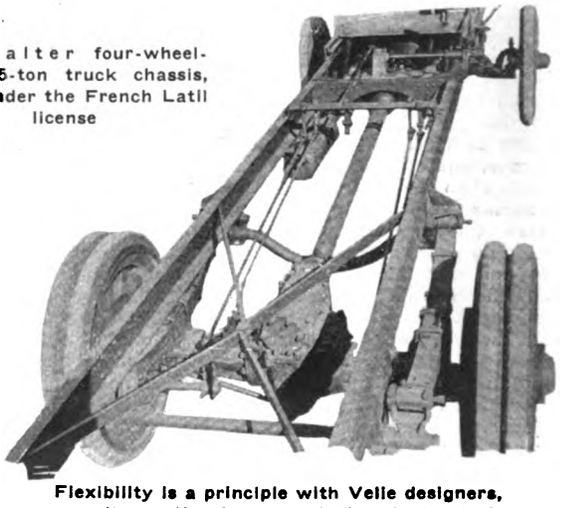
Side and overhead chassis view of the ½-ton Vim. The body is one of the most luxurious which the company produces





Velie 2-ton truck, which employs Hotchkiss drive

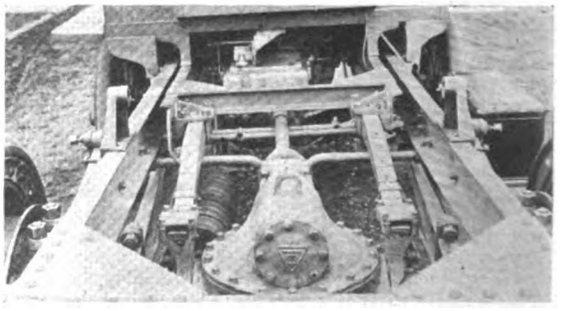
The Walter four-wheel-driven 5-ton truck chassis, made under the French Latil license



Flexibility is a principle with Velie designers, as witness the frame and the single shaft from the unit powerplant



The Watson 5-ton tractor is a new product which is exceptional in its compact construction



It has worm drive and an interesting dual frame and spring system, protecting the powerplant when running light

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els are sold at the same prices as last year and the 5-tonner sells at $400 more than the first 1916 model of the same capacity.

Slight changes have been made in all models as compared with last year's vehicles. All models now have cellular cast-case radiators instead of square-tube sheet-case designs except the new 5-tonner which has finned tubes in a cast case. All models also have hand spark advance instead of the fixed type.

United trucks are assembled from standard parts and are sold throughout the United States. They may be purchased on time payments through any of the concerns like the Guarantee Securities Corp., which make a specialty of handling the sale of motor vehicles on installments.

United trucks are sold as chassis or complete with several types of standard bodies. Electric starting and lighting are not supplied as standard but may be had at an extra cost. Trailer draw-bar connections are provided on United trucks when so ordered.

All four United models follow the same general design in that each has a rolled-channel frame of the rigid type, a dry-disk clutch, selective gearset, worm drive and springs which take both the driving torque and propulsion. The 5-tonner differs from the other three models in that it has steel wheels with cruciform spokes instead of wood wheels and a four-speed gearset mounted amidships instead of in a unit with the motor. The 5-ton model also differs from the others in that it has a centrifugal governor driven off the driveshaft instead of suction governors driven off the motors as in the three smaller models. The front springs of the 5-ton truck are different from those used on any other United model in that they are pinned at their rear ends and carried in unique shackles at their front ends. This construction was introduced because of the effect of steadying the steering.

Universal

Three-model Line Is Unchanged

NO CHANGES in prices or design have been made in Universal trucks which are offered for this year by the Universal Service Co., Detroit, in three models of 1½-, 2- and 3-ton capacity. The smallest model is worm driven and the other two chain driven. The chain drivers have their motors under the floors and are substantially the same as offered in 1915. The worm-driven model differs from the other two in that it has its motor under a conventional hood forward of the dash.

Universal trucks are partly assembled and partly manufactured and are sold nationally. Electric starting is not indorsed by the Universal company but electric lighting is furnished as standard equipment on all three models.

Although differing in final drive and motor location, all three models have some points in common including rigid frames, loose-ball governors and selective gearsets. The 1½-tonner has a rolled-channel frame, a finned-tube cast-case radiator and a dry-plate clutch and a three-speed gearset in a unit powerplant. The 2-tonner is like the smaller model in that it has a rolled channel frame instead of one made of rolled I-beams. The 2-tonner follows the 3-ton unit more closely, however, both having the same-sized motors, cellular sheet-case radiators, dry-disk clutches and three-speed selective gearsets mounted amidships, final chain drive and right steer and control.

U. S.

Two Chain-Drivers Added to Worm Line

REDUCTION in prices and the addition of two chain-driven models are the most important features of the 1917 line of U. S. trucks, made by the United States Motor Truck Co., Covington, Ky., which last year moved its head offices from Cncinnati so that all of the plant is now in Covington. All models of last year's line were worm driven. This year's offering consists of 2-ton worm- and chain-driven models, a new 3-ton chain driver and 3½- and 5-ton worm-driven trucks. The 2-ton worm driver is carried over at a price reduction of $200, from $2,700 to $2,500; the 3½-tonner at a reduction of $250, from $3,400 to $3,150, and the 5-tonner at a reduction of $200, from $4,200 to 4,000, notwithstanding that this year's model has a 4¾ by 6¾ motor instead of a 4½ by 5, a horsepower increase of 3.75.

Practically all the component parts of U. S. trucks are assembled from standard parts except the frame and frame members, seats and steel cabs.

U. S. trucks are sold throughout the United States and in Cuba, England and France. They may be purchased on installments on a plan requiring a cash deposit of 50 per cent and the balance in equal payments within a year.

The United States company builds a large assortment of all-steel bodies of various designs for its trucks. It does not indorse electric starting and lighting systems for solid-tired trucks because of its belief that the present apparatus will not stand up and because of its present high cost. The company also discourages the use of its standard chassis in connection with trailers and provides trucks with lower gear ratios for such work.

Aside from the difference in final drive, all U. S. trucks follow the same general design and have semi-flexible rolled-channel frames, square-tube sheet-case radiators, dual ignition with hand spark advance, centrifugal governors driven from the motors, cone clutches and three-speed individual-clutch gearsets mounted amidships. The worm-driven models take the torque and propulsion through the springs. All have left steer and center control except the 5-tonner, which has the steering wheel at the right and the levers in the center.

Velie

Two Models Continued Without Change

UNCHANGED in price and practically the same in design, Velie trucks, made by the Velie Motor Vehicle Co., Moline, Ill., are offered in two worm-driven models of 2 and 3½ tons capacity. This year's 2-tonner is substantially the same as last year's 1½-ton offering except that it has larger rear tires. The 1917 3½-tonner is the same as last year's offering except that it takes the driving torque through the springs instead of a torque arm.

Velie trucks, made by the same concern which produces the Velie passenger cars, are mostly assembled from standard parts and are sold throughout the United States and to some extent abroad. They may be purchased on instalments on any of the plans offered by concerns handling time-payment motor vehicle business.

The Velie company does not indorse the use of electric starting and lighting but will furnish an electric starter unit on its smaller truck at an extra charge. The Velie company does not recommend the use of trailers with its trucks except its own engineers investigate the conditions under which the vehicles are to work. If these are found favorable, it will make provisions in its trucks for such use.

Velie trucks follow the same general lines. Each has a pressed steel frame of the flexible type, a finned-tube cast-case radiator, a vacuum gasoline-feed system, a centrifugal governor driven from the motor, a dry-plate clutch and a four-speed selective gearset mounted amidships. Right drive and right steer are adhered to in each model.

Vim

1,000-pounder Increased $25 in Price

INCREASED $25 in price, from $620 in the chassis to $645, as compared with last year, Vim commercial vehicles are carried over in one model of 1,000 pounds capacity. It is practically the same as last year except for a 2-inch increase in wheelbase from 100 to 102 inches and slight minor refinements.

The Vim was formerly made by the Touraine Co., Philadelphia, Pa., until the latter concern was reorganized in 1915 as the Vim Motor Truck Co. and began the erection of a large new plant which was occupied during the fall of 1916.

Vim trucks are mostly assembled from standard parts and are sold from 600 cities in the United States. They are also sold abroad and may be purchased on a deferred-payment plan in which $200 must be paid on order and the balance in three, six, nine or twelve equal monthly instalments. The Vim company does not indorse electric starters because of its belief that they are too costly and too easily put out of order. The Vim company carries a stock of twelve standard bodies for its chassis, most of which are sold complete with one of the various body designs.

The Vim has a pressed steel frame, a finned-tube sheet-case radiator, a unit powerplant with a cone clutch and a three-speed selective gearset and bevel drive on the Hotchkiss plan.

Walter

Two Models Added to External-gear Line

CHARACTERIZED by a spur-gear drive made in this country under the license of the Latil company of France, Walter trucks, made by the Walter Motor Truck Co., New York City, are offered this year in a new model of 3½ tons capacity with four-wheel drive and steer and a new 7½-tonner with rear drive only. The latter vehicle is similar to that of last year except that it has rear drive instead of four-wheel drive and sells for $4,750 instead of $5,250, a reduction of $500. These sizes will be specialized on for this year, although the Walter Company also offers the four-wheel-driven model in 5-ton capacity and as a tractor and the rear-wheel-driven vehicle in 5- and 6-ton capacities and also as a tractor.

A new feature of all Walter trucks is a patented locking differential described and illustrated in the November 15, 1916, issue of THE COMMERCIAL VEHICLE.

Walter trucks are made from parts manufactured by the Walter company and are sold mostly in New York state. They are offered in the chassis only and may be purchased on time by paying 25 per cent down and the balance in equal monthly notes payable within 6 months.

The Walter company does not indorse electric starting and lighting systems but will furnish such equipment at an extra charge. All Walter trucks are recommended for use with trailers.

Except for the final drive, all Walter trucks follow the same general design with flexible, pressed-steel frames.

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Ware

Four-wheel Drivers Continued

FOUR-WHEEL DRIVEN, Ware trucks, made by the Twin City Four Wheel Drive Co., St. Paul, Minn., are offered in three models of 2-, 3- and 5-ton capacity, all of the same general design.

Ware trucks are partly assembled and partly manufactured and are sold principally in the middle west. All three models have their motors mounted on subframes carrying also the clutches and gearsets of the three-speed individual - clutch type. The motor in each case is carried under a conventional hood and drives through two universals and one differential to the rear axle and then by two shafts to both front wheels. The latter are mounted on hollow ball universals through which the drive is transmitted and which also enable the wheels to be turned for steering purposes.

Another special feature of the Ware truck is the use of two steel reaches between the front and rear axles, one on each side. These take the place of the torque and propulsion members. The frame of the truck is of wood, armored with steel.

Watson

5-ton Tractor Brought Out in 1916

BROUGHT out early in 1916, the Watson 5-ton worm-driven tractor is the only offering of the Watson Wagon Co., Canastota, N. Y., for this year. The Watson 5-ton front-wheel-driven bottom-dump truck produced last year from parts secured from the Walter Motor Truck Co., New York City, has been temporarily discontinued.

The tractor is assembled from standard parts and is to be sold throughout the United States. Two styles of trailers are furnished by the Watson company for use with its tractor. The Watson company offers electric starting and lighting equipment on its tractor as extra equipment.

The frame construction comprises two separate units, a mainframe of conventional design and an inside sub-frame pivoted to the former at the front. The sub-frame carries the powerplant and the driver's cab while the mainframe supports the axles, springs and fifth-wheel connection. By this construction the powerplant is relieved of the excessive vibration to which it would be put when the tractor was running unloaded were the powerplant carried on the stiff load-supporting springs.

The rear end of the sub-frame is supported on the worm-driven axle housing in two vertical brackets. The tops of the brackets are yoked and carry plates forming friction boxes on which the tips of the springs slide, thus eliminating shackles.

The fifth-wheel connection is of a new type and in reality is not a fifth-wheel in the true sense of the word but rather a rocking platform supported at its ends by brackets attached to the mainframe. The platform is made of angle irons and is provided with a socket for the king-bolt and two inverted skids on its top. Vertical motion in negotiating rough roads is allowed for by the swinging of the platform about its brackets. In turning corners the front end of the semi-trailer slides over the top of the platform.

Wichita

Worm Drivers Added in 2½- and 5-Ton Sizes

ADDING 2½ and 5-ton worm-driven models and dropping a 2-ton worm driver, the Wichita Falls Motor Co., Wichita Falls, Tex., makes a line of seven models for this year. The offering consists of two 1-tonners and one model each of 1½, 2, 2½, 3½ and 5-ton capacity. One of the 1-tonners is chain driven and the other worm driven. The latter is carried over at the same price as last year, but the chain driver has been reduced $300, from $1,650 to $1,350.

The 1½-tonner, the chain-driven 2-tonner, and the 3½-tonner with worm drive, have been carried over at the same prices and in the same design, except that the 3½-tonner is equipped with 4½ by 5¾ motor, with a N. A. C. C. horsepower of 32.40, instead of a 4¼ by 5¾, 29.00 hp. Another change made in all of this year's Wichita trucks is the use of cellular cast-case radiators instead of the cellular sheet-case type used last year.

Wichita trucks are partly manufactured and partly assembled from standard parts. They are sold throughout the United States and in thirty-one foreign countries. While the Wichita company does not sell its trucks on deferred payments, its dealers may do so, handling the notes through the Empire Securities Co., Chicago, or the Guaranty Securities Corp., New York City.

The Wichita company offers standard bodies, and about 25 per cent of its trucks are sold complete with bodies. Electric starting and lighting units are furnished on all models at extra cost. Trailers are indorsed for use with Wichita trucks, which can be had in 3 and 4-ton tractors, with either worm or chain drive, and in 8 and 11-ton vehicles with worm drive.

All Wichita trucks have pressed - steel semi - flexible frames, cone clutches, and three-speed selective gearsets.

Special high-wheeled models are built for use on bad roads.

Wilcox

Two Heavier Models Added to Line

PRICE INCREASES, the discontinuance of its ½-ton model, and the addition of new 2 and 3½-ton models, feature the 1917 line of Wilcox trucks, made by the H. E. Wilcox Motor Co., Minneapolis, Minn. The 1916 ½-tonner was bevel driven. The 1916 1 and 2-tonners are carried over without changes in design but at increased prices, the cost of the 1-ton model being raised from $1,600 to $1,750, and that of the 1½-tonner from $1,800 to $2,150. The new 2 and 3½-ton chassis follow the same general lines, and are worm driven.

The ¾ and 1-ton models are assembled from standard parts, while the motors, clutches and gearsets of the 1½, 2, and 3½-tonners are of Wilcox manufacture. Wilcox trucks are sold mostly in the Northwest.

All of this year's line of Wilcox trucks are worm driven, and all have pressed-steel frames of the rigid type, centrifugal governors driven from the motors, selective three-speed gearsets, and springs which take both the torque and propulsion. Cone clutches are used on all except the ¾-ton model. Electric lighting is furnished as stock equipment on all models.

Wilson

New 1-Tonner to Be Added to Line

OFFERED for the present in but one model, of 2 tons capacity, another chassis of 1-ton burden will be added to the Wilson line by the J. C. Wilson Co., Detroit. The newcomer will follow the same general lines as the 2-tonner. The latter has been carried over from last year at an increased price of $350, selling at $2,350 instead of $2,000. It has also been changed slightly in design, having a heavier frame, springs and steering gear and a metal dash.

The Wilson truck is an assembled product, sold principally in New England, Michigan, and the Middle West. The Wilson company does not sell its trucks on any form of deferred payments, although its dealers may do so by co-operation with any one of the companies which finance such transactions.

Wilson trucks are sold as chassis only, except in Detroit, where the Wilson company has furnished a standard rack body with cab. The Wilson company is one of the oldest wagon-building companies in the Detroit territory.

The Wilson company does not indorse electric starting or lighting, and does not furnish such equipment on its trucks. The company recommends the use of trailers with its trucks.

The Wilson truck has a rolled-channel, semi-flexible frame, a finned-tube cast-case radiator, a block-cast motor, cone clutch, three-speed selective gearset mounted amidships, and final worm drive, with the torque and propulsion taken through the springs.

White

All Models Continued Unchanged

CONTINUED without change in price or design, White trucks are offered in four models for this year by the White Co., Cleveland, Ohio.

The White company has not been seriously affected by the material market and its plant has been running at maximum capacity, day and night, since the beginning of the war in August, 1914.

White trucks were first manufactured in 1910 and this year's product is essentially the same as that of 1910 except for minor improvements. The complete line consists of models of ¾-, 1½-, 3- and 5-ton capacity and also a Good Roads model substantially the same as the 5-tonner except that it has a six-cylinder motor instead of a four and steel wheels with wide steel tires instead of the conventional rubber ones.

All models are of similar design except for the final drive, the ¾-tonner being bevel driven, the 1½-tonner employing double-reduction gearing and the 3- and 5-tonners double-chain drive.

White trucks are a manufactured product which is sold nationally and also in Europe, Asia and the Orient. They are not offered on any form of time payments. The White company does not indorse the use of starting and lighting equipment on its trucks unless sold for fire, ambulance or police patrol work. It will furnish such equipment on its two smaller models for ordinary commercial service when so ordered and at an extra charge.

Trailers are indorsed for use with White trucks only after a thorough investigation has been made by White engineers of the conditions under which the trucks will have to operate. If these are considered favorable, the company will fit its vehicles with special frame ends for the attachment of the trailer draw-bars.

All White trucks have motors with the cylinders cast in block with the valves at the right, cellular sheet-case radiators, single ignition with hand spark advance, wet-plate clutches, four-speed selective gearsets mounted amidships and left steer with the control levers divided, the gear-change lever at the center and the brake lever at the left. The models are also alike in that none are provided with governors.

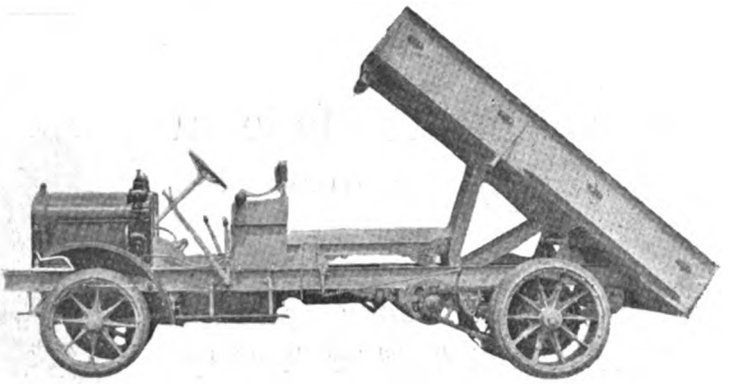
The two smaller vehicles have pressed steel frames and the

(Continued on page 56)

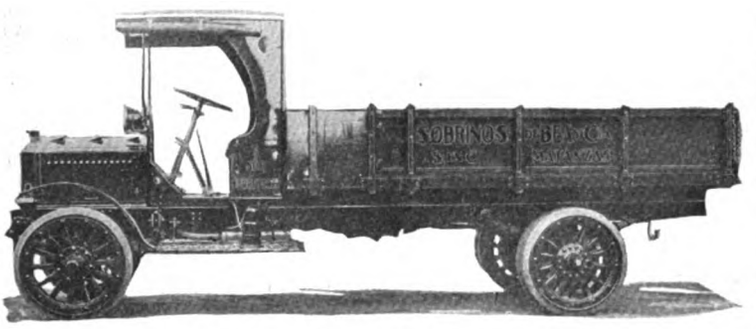
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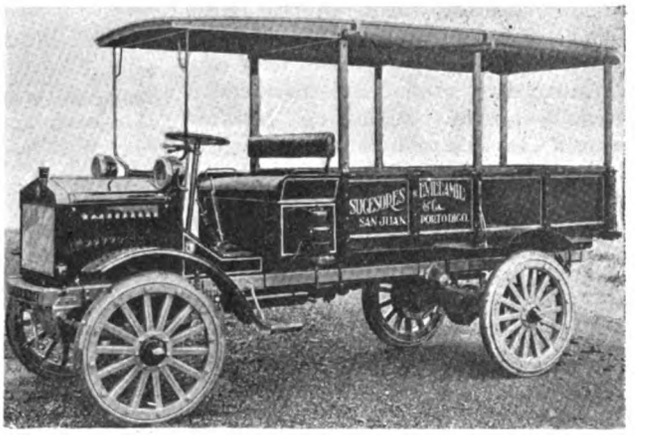
White 1½-tonner, one of the few American trucks to use double-reduction drive



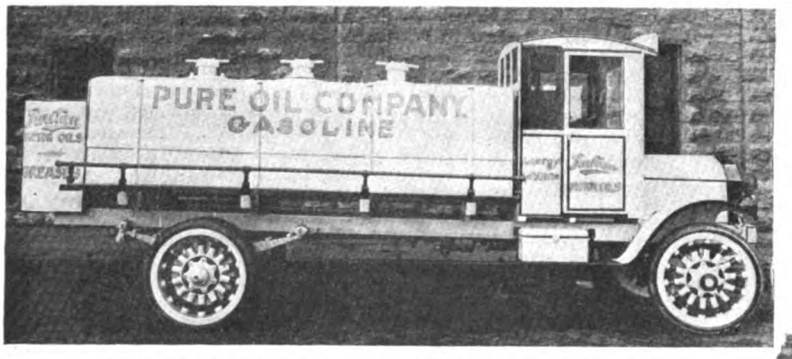
White 5-tonner with a dumping body. The horizontal screw hoist used is produced by the White Co.



Wichita 3½-tonner which hails from Texas



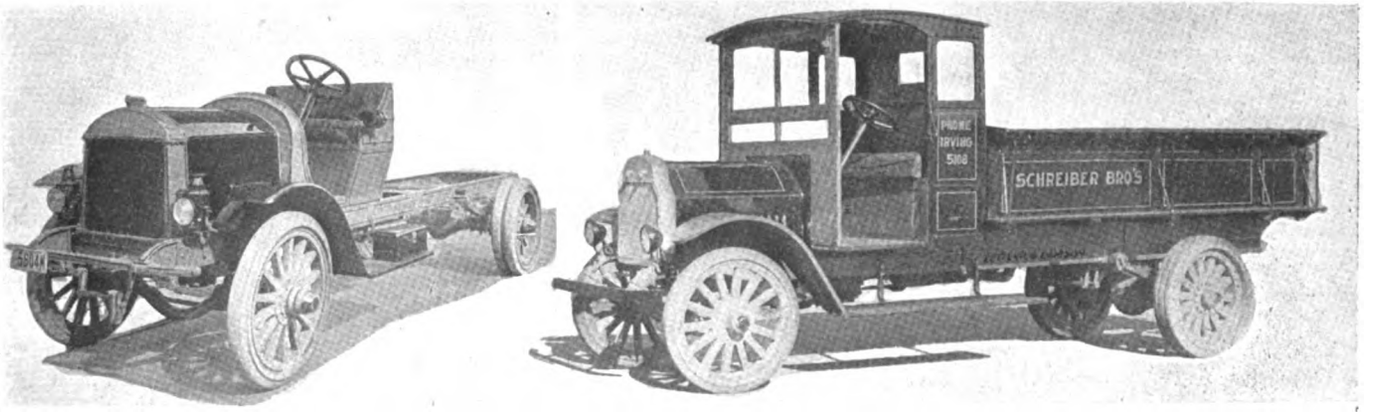
An unusual type of Wichita made for bad roads in Porto Rico, for 2-ton loads



A Wilcox of 3½-ton burden with the closed and comfortable cab which is demanded in the northwest



From the nation's capital comes this Witt-Will 1-tonner



Wilson 2-tonner and a Zeitler & Lamson of the same size, one hailing from Detroit, the other from Chicago

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Improvements Made In Fargo 2-tonner

Smaller Engine, Higher Speed and Lower Reduction Effect Economy



The new Fargo 2-tonner, showing aluminum radiator casing

IMPROVEMENTS in minor construction have been made in the Fargo 2-tonner for 1917. The 1-tonner is carried over practically as before. The new Fargo follows conventional construction throughout, its outstanding features being a cast-case radiator, internal-gear drive and the Hotchkiss torque and propulsive system.

The chiefest difference between the old 2-tonner and the new one is that the motor is smaller in the new model and the gear-ratio is lower. This means that the same power is secured, but at higher engine speeds, since the governor is set for the same speed in miles per hour. This should make for higher efficiency and economy and lighter weight.

The engine is a Continental with four cylinders in block with valves to the right. It is thermo-syphon cooled through a National radiator having horizontal finned tubes and a cast casing.

Single ignition is supplied by a Bosch magneto with hand spark advance. At an extra charge of $150 a Westinghouse 6-volt two-unit starting and lighting outfit with a 120-ampere-hour battery will be installed.

The governor is the Monarch suction type and is locked when adjusted so that the driver may not tamper with it. The Rayfield carbureter is fed by gravity from the fuel tank under the seat.

The clutch and gearset are incorporated with the engine in a unit powerplant. The clutch is a Fuller, as is the gearset, and is of the dry-disk type. The gearset affords three speeds on the selective plan.

From the gearset a single shaft with two universals takes the drive to the Russel internal-gear-driven axle, this being made possible by the shaft being tubular in form. Brakes are all on the rear wheels, the hand brakes being internal and the foot brakes external. The steering wheel is to the left and the levers are in the center.

FARGO SPECIFICATIONS

Capacity, lbs.	4,000
Price	$1,700
Wheelbase	144*
Tires—Front	36x4
Rear	36x6
Bore	3¾
Stroke	5
N.A.C.C. Hp.	22.50
Speed, r.p.m.	1,250
m.p.h	15
Gear-ratio in high gear	9-1
Final drive	Internal-Gear

*132- and 156-inch wheelbases optional.

Warner Heavy-duty Trailers in Four Sizes

Truck Type Reversibles and Dump Type

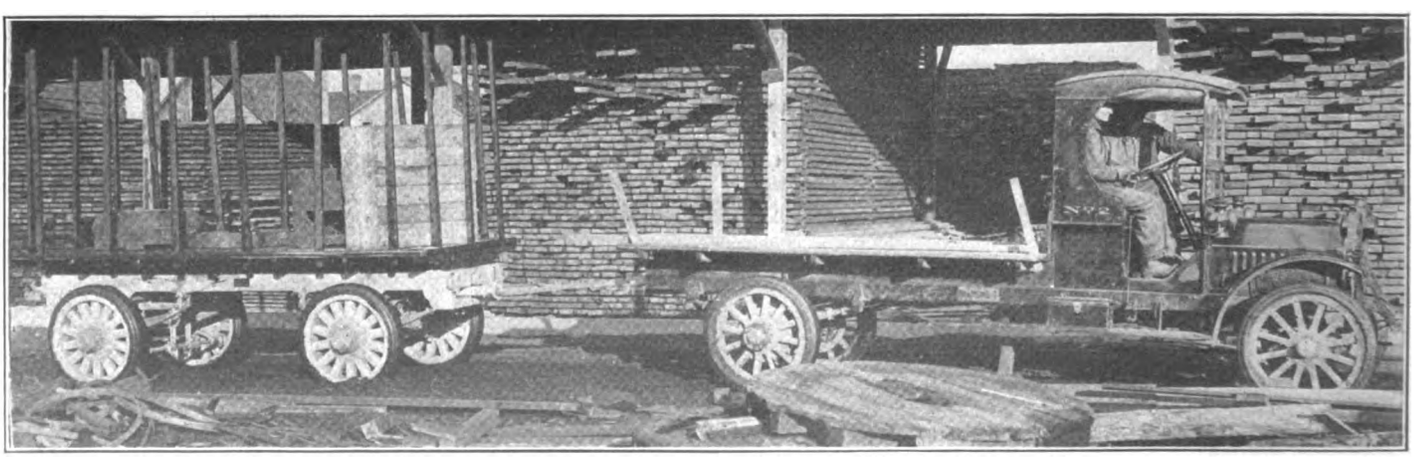
FIVE models of heavy-duty reversible trailers are produced by the Warner Mfg. Co., Beloit, Wis., former manufacturer of Warner speedometers and more recently producer of the Warner light trailer and camping trailer.

The new heavy-duty trailers are practically trucks without motors, their feature being an original form of steering gear and a special form of drawbar. In design the trailers are all alike and they vary from 1½ tons to 7. There are models of 1½, 2½, 5 and 7 tons and a gravel dumping trailer rated at 4 yards.

All have heavy rolled channel steel frames of the rigid type, four semi-elliptic springs and I-beam Elliot type axles. The axles are exact duplicates, having motor truck type of steering knuckles and tie-rods back of the axles instead of in front. The connections are laid out on the Ackerman plan but steered in a different manner from the usual method.

Each tie-rod has at its center a vertical yoke, pivoted at its top end to a second yoke attached to the vertical pin to which the drawbar is pivoted. This pin is mounted on a cross-member of the frame of robust proportions. The action of these yokes is to move the tie-rod to right or left in response to the swinging of the drawbar, their jointing allowing them to adapt themselves to the difference in direction of motion of the tie-rod and the drawbar.

The coupling consists of a block on the end of the drawbar which fits in the forked connecting bar attached to the tractor coupling or the trailer following. This block has a socket for the horizontal pin in the end of the connecting bar. This socket has a snap lock at its top, so that when the pin is dropped into it, it is locked in place. This allows for ver-



Warner trailer with lumber body in tow of a truck

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tical differences in the level of truck and trailer while retaining lateral rigidity to effect correct steering of the trailer.

The connecting bar is, like the draw-bar, of steel. At its other end it has a single universal pin connection which fits the bracket attached to the rear of the truck, or an eye carried at the end of the draw-bar coupling block.

The four corners of the trailer frame have heavy steel bumpers which are integral with the spring hangers, the shackled ends of the springs being on their inner ends. These provide a rigid mounting for the springs so that they can take the pull of the axles without the aid of radius rods and also protect the springs and the frame from harm in the event of a collision.

At each corner of the trailer is a towing hook on a vertical pivot. The wheels are of wood and very heavy, with large hubs containing Bower roller bearings, inclosed by hub-caps. They have standard S.A.E. felloe bands to carry regular solid rubber tires.

WARNER TRAILER SPECIFICATIONS

Capacity, lbs.	3,000	5,000	10,000	14,000
Price, chassis	$585	$875	$1,295	$1,485
Frame length, in.	144	144	144	150
Section of frame, in.	5	5	6	6
Tires	36x3	36x4	36x6	36x7

The 4-yard gravel trailer has a 7-in. frame and sells for $1,350.

Demonstrator Treks Across Ten States

(*Continued from page* 11)

dinner, "with all the fixin's" was eaten at Orr's Ranch, in the middle of the Great Salt Lake Desert. They were lucky to have dry weather in this desert. The highway was visible for miles ahead, hard as rock. Rain makes it totally impassable. At Fish Springs, near the mountains, they found the road a little wet, and had to go in second speed at night.

They spent the night at the old Pony Express station. They asked Old Man Thomas, who put them up, why he didn't carry some motor repair parts, and he astonished them by saying he had some parts for all machines, and a complete stock for Fords, closing with a chuckle and saying, "The barn's full of ol' wire off baled hay." He never boils water. Took the boys out to wash in a pet hot spring back of the house. They paid him 60 cents a gallon for gasoline, then passed another hot spring and came to a man in the mudhole, working in the mud to his neck trying to jam rocks under the wheels of a touring car that had been sinking slowly for 2 days. No doubt bound for Hades, by the evidence on the surface of this treacherous section of the earth's crust. They made the best friend of Republic trucks in America of that man—hauled his car out without a scratch.

Then they were in a desolate region, all mountains in every direction. They went over three great passes, then came to Ely. The highest took them up to 8700 ft. Shelburne pass was dangerous traveling, but fortunately encumbered with very little snow. They stayed at Ely 2 days awaiting advice on road conditions through the Sierras, then impassable at most points, and set out on the Midland Trail for southern California on Dec. 4 at 4:30 p.m. Continuous mountain country is characteristic of this region.

They camped in the mountains over night, then drove through a long valley to the Hot Spring Range, where they found a spring hot enough to boil eggs. Next a great mountain pass, then Tonopah, then Goldfield and another 8500-ft. pass, Westgard Pass, followed by three more big passes before reaching Big Pine, still east of the High Sierras, and in the valley that takes the shadow of mighty Mt. Whitney, towering over 14,000 ft.

Dewey looked up to its distant summit and tried to estimate how many times higher they would reach if all the grades they had climbed to that day were placed end to end in one mighty ascent. The result would stagger the imagination if it could be visualized. But it is a simple summation of actual achievement.

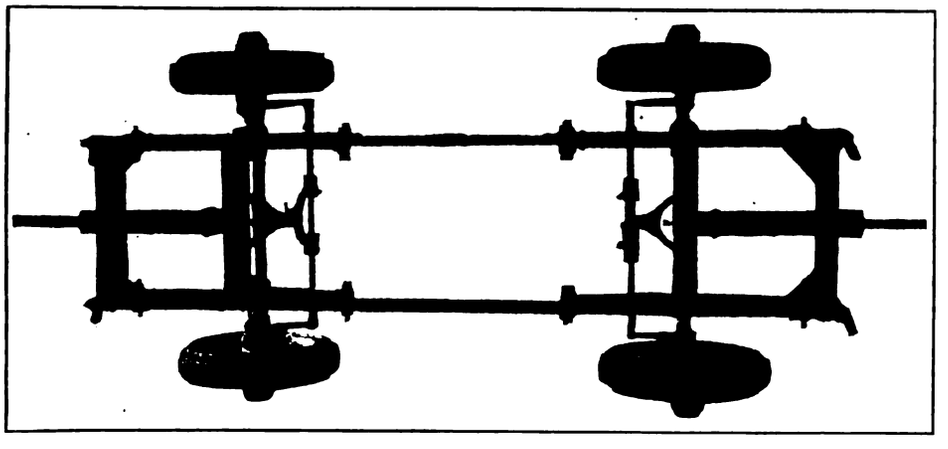
South through the Owens River Valley the truck made 165 miles to Mojave by evening, and the following day went up and down through the famous Tehachepi Pass into Bakersfield, center of California's oil industry, thence, after a delay for business, north to Fresno, the Raisin City.

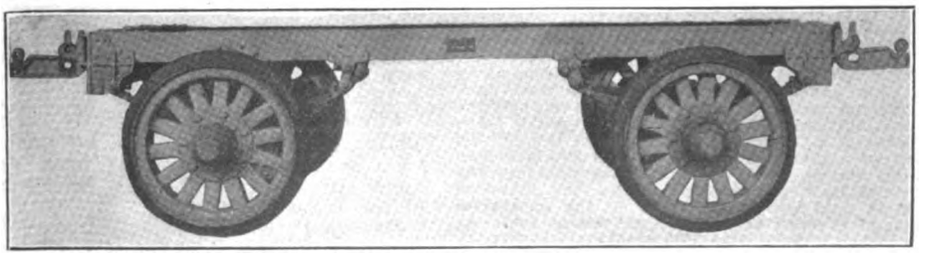
The final leg of the journey was again south through the great central valley, 150 level miles of delight, mostly over asphalt pavement, to the Tejon Pass, and the famous Ridge Route, 29 miles of continuous mountain road, through Saugus, down Newhall Pass to San Fernando. Spending the night here, to make the entry into Los Angeles by daylight, Poyer and Dewey went to Universal City, smiled as they were told that their final nine miles to the center of Los Angeles would take them through Cahuenga Pass, in the Santa Monica Range, threw in the clutch and completed the tour of the Republic Dispatch.

Record: Distance, 4080 miles; average 15.3 miles to gallon of gasoline for the whole trip, 17.3 in California; 62 miles to the quart of oil. Carburetor worked perfectly at all elevations. One trouble requiring repairs, slight defect in casting in clutch drive. Adjustments, took up connecting rods once and ground valves once.

At Kansas City the smooth-tread front tires with which the truck started from the factory were removed. One rear tire, which was in good shape, was transferred to the front, and spare non-skid brought from the factory was put in front on the other side. New non-skids were mounted in the rear. No changes were made after this, and the tires finished the trip in good shape, including the one that came all the way through from the factory.

Accomplishment: Demonstrated efficiency of motor trucks, and especially this model, in continuous contest with all unfavorable conditions of road and climate; discovered new fields for development in motor truck hauling; learned that the day of the horse is past in mountain and desert hauling; gave the new Republic model a thorough try-out, and let dealers see it in action, and took it to out-of-the-way places that had never heard of it, and came through the whole trip, being pulled out but once, and shipping on only two occasions, as recounted—a successful trip.





Plan and profile views of 5-ton Warner reversible trailer

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Men and Makers



FEDERAL MOTOR TRUCK CO., Detroit, has prepared plans for the erection of another large assembling plant in order that its 1917 production may be still further increased. While the space of the Federal company has been doubled during the past year, the present quarters are still too small for the large output planned during this year.

United States Truck Co. of Michigan is the name of a new concern formed by George Benham to handle the sales of U. S. motor trucks, made by the United States Motor Truck Co., Covington, Ky.

Steel Products Co., Cleveland, Ohio, will move its Detroit office on Feb. 1 from 1515 Ford building to the Michigan electric welding plant of the Steel Products Co. at 514 Hart Avenue, Detroit.

Ladish Drop Forge Co., Milwaukee, Wis., is the new corporate name of the Ladish-Obenberger Co., which in turn was formerly known as the Obenberger Drop Forge Co. John Obenberger withdrew from the latter concern several months ago and has founded a new drop-forge company known as the John Obenberger Forge Co. The plant of the latter concern is in West Allis and the Ladish plant is in Cudahy.

Gearless Differential Co., Detroit, is planning to move to Chicago, provided financial dealings with that city prove successful, as now seems almost assured. The company expects to increase its capital and will manufacture on a larger scale than in the past, maintaining its present plant at Defiance, Ohio.

M. & S. Corp., Detroit, has moved into its new plant devoted to the manufacture of motor vehicle differentials, and will add additional equipment to give a capacity of 400 differentials a day by Feb. 1, 1917.

Walker Mfg. Co., Racine, Wis., manufacturer of steering gears and other motor vehicle accessories, has moved into its new plant in that city, where it will have more than three times the space available in its former shops.

Tonford Motor Co. of New England was recently formed at Boston, Mass., to handle the Tonford adapter of the Detroit Truck Co. It has temporary quarters at 839 Beacon Street, but will move to 584 Commonwealth Avenue shortly and maintain a service station at 708 Beacon Street.

Seiss Mfg. Co., Toledo, Ohio, maker of motor vehicle horns and lamps, will increase its working force from 60 to 135 workers as soon as its new factory structure is completed.

Standard Malkonite Co., Pittsburgh, Pa., has been formed to manufacture malconite for battery jars, conduits and other similar forms of non-conducting material. The malconite can be molded into any shape and can be made in any thickness or color desired, according to the claims of the new company. The latter has opened a new office in New Galilee and has purchased land there, upon which it will begin erection of a plant in the early spring.

C. M. Hall Lamp Co., Detroit, plans to exercise its option on the Badger Brass Co., Kenosha, Wis., and will complete the purchase details shortly.

Vacuum Oil Co., New York, is planning to move into its new plant now under construction near Paulsboro, N. J., by April 1. The new factory will employ about 500 men, and is so located as to have dock facilities for ocean steamers and is furnished with 18,000 feet of railroad track for overland shipments. The oil reaches Paulsboro by means of a pipe line under the Delaware River.

Arthur W. Robinson, formerly truck sales manager and a director of the Locomobile Co., Bridgeport, Conn., has been promoted from director of Gaston, Williams & Wigmore, Ltd., Alexandria House, Kingsway, London, to the position of managing director of the concern.

R. E. Chamberlain has been promoted from the position of truck sales manager of the Packard Motor Car Co. of New York to the position of truck sales manager of the Packard Motor Car Co. of Detroit. Mr. Chamberlain took up his new duties at the Packard factory Jan. 15. He was formerly identified with the H. E. Wilcox Motor Car Co., Minneapolis, Minn., and with the Garford Motor Truck Co.'s branch in Philadelphia, Pa. He had been with the New York Packard organization for about 6 months before his present promotion.

Edwin A. Travis, formerly assistant sales manager and before that manager of the Locomobile branch at Boston, Mass., was recently appointed general sales manager of the Locomobile Co., Bridgeport, Conn.

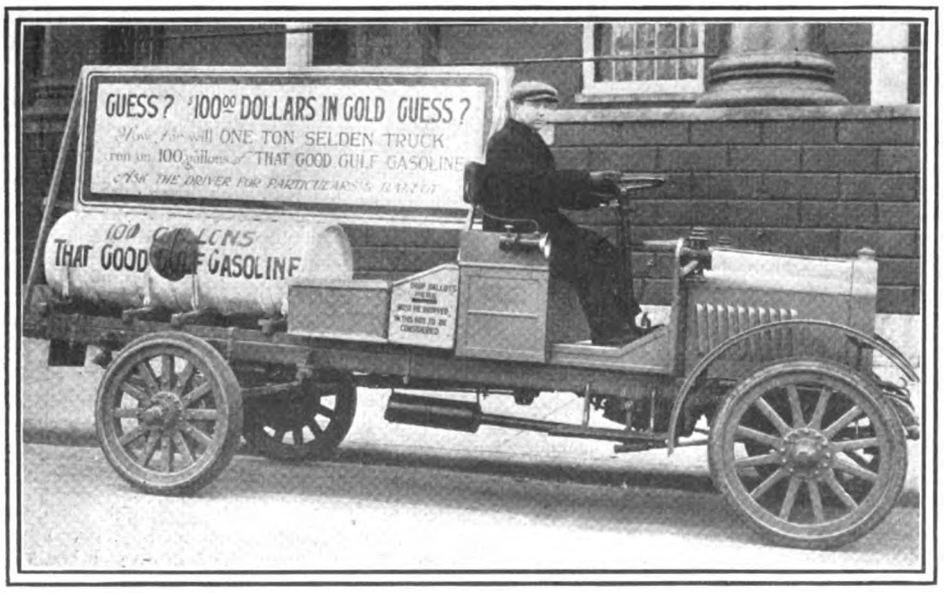
Delmar G. Roos, associated with the engineering department of the Locomobile Co., Bridgeport, Conn., for several years, has been appointed assistant chief engineer for the same concern. He has done considerable research engineering work for the Locomobile organization.

Percy W. Hine, formerly identified with the sales department of the Locomobile Co., Bridgeport, Conn., at the executive offices, has been appointed manager of the Bridgeport Locomobile branch and territory. He will also be in charge of the service rendered at the Bridgeport factory to the owners of Locomobile passenger cars and Riker trucks.

Thomas E. Swayne has been transferred from the Oakland, Cal., branch of the Locomobile Co., Bridgeport, Conn., to become manager of the Los Angeles branch of the same concern. He succeeds J. Murray Page, who was appointed manager of the Chicago branch of the Locomobile company.

Clinton B. Amorous, formerly assistant purchasing agent of the Locomobile Co., Bridgeport, Conn., has been promoted to the general sales department of the same concern.

George P. Hewitt, sales manager for the Four-Wheel Drive Auto Co., Clinton-



A novel method of bringing motor trucks to the attention of possible buyers walking along the streets is shown in the above illustration. The scheme was worked out by the Truck Service Co., Philadelphia, Pa., distributor of Selden trucks in that city and across the Delaware River in Camden, N. J., and is a guessing contest as to how far a Selden 1-ton truck will run on 100 gallons of gasoline. As pictured, a 100-gallon gasoline tank is mounted on a 1-ton Selden chassis and a line connected with the carburetor. The truck is driven about town and the driver provided with voting blanks upon which persons entering the contest may write their guesses. The votes must be deposited in a ballot box mounted directly aft the driver's seat. A prize of $100 in gold will be awarded to the successful contestant who guesses nearest the actual mileage covered on the 100 gallons of fuel. At this writing the novel scheme has proved very successful, more than 3000 votes having already been cast

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ville, Wis., maker of the F. W. D. motor trucks, attended the New York City motor vehicle show in search of sales representatives for his concern in the leading cities of the East. New representatives are to be selected in New York, Philadelphia, Baltimore, Washington, New Haven, Hartford, Providence and Boston.

Andrew Langerbacher, formerly with the sales organization of the Reo Motor Car Co., Lansing, Mich., has been appointed sales manager of the Duplex Motor Truck Co., of the same city, formerly located in Charlotte, Mich.

G. H. Schaffner has been appointed manager for Cleveland, Ohio, sales and service for Denmo motor trucks, made by the Denneen Motor Co., of the same city. He was formerly with the Safe Motor Sales Co.

Alvin Macauley, president of the Packard Motor Car Co., Detroit, was last week elected a member of the board of directors of the National Bank of Commerce.

J. W. Barber, identified with the Peerless Motor Car Co., Cleveland, Ohio, for the past 8 years, has recently been appointed manager of the retail sales for the Cleveland district.

Harold C. Vance has been appointed acting purchasing agent of the Studebaker Corp., Detroit, to fill the place made vacant by the death of C. J. Reynolds.

L. H. Hazard, associated with C. B. Rose for several years as assistant engineer of the Velie Motor Vehicle Co., Moline, Ill., has recently been elected chief engineer in charge of creation and design.

Henry Lansdale, at one time vice-president and general manager of the Denby Motor Truck Co., Detroit, has been appointed manager of the carriage sales department of the Packard Motor Car Co., Detroit.

Harris F. Holland, of Indianapolis, Ind., has been appointed sales manager of the motor truck division of the Myers Machine Co., Sheboygan, Wis., maker of the Wisconsin commercial vehicle. Mr. Holland succeeds L. P. Helm, resigned.

C. B. Rose has been elected vice-president of the Velie Motor Vehicle Co., Moline, Ill., and will take charge of purchasing and production.

Hugh McBreen, formerly secretary of the Red Sox baseball team at Boston, Mass., has joined the sales force of the General Motors Truck Co. at Boston, Mass.

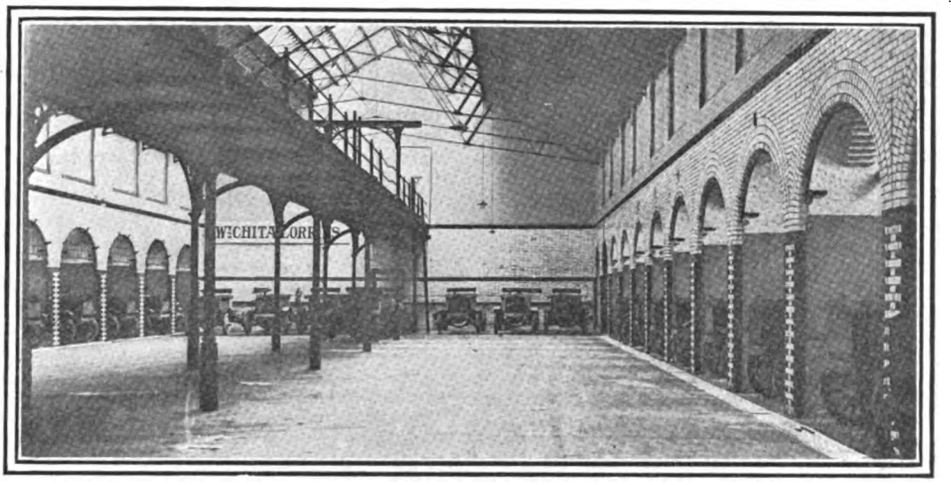
George Grow, who is one of the biggest dealers in used trucks and cars in this country, last week bought the big four-story building formerly used by the Connell & McKone company on West Newton Street, Boston, as a service station. He bought it from the Willys-Overland Co. and will use it as a truck salesroom.

Cummings & Stilphen, agents for Dodge Bros. cars at Augusta, Me., have taken on the line of Velie trucks for central Maine.

Fowler Motor Co., Springfield, Mass., agent for Kisselkar trucks, has moved into new quarters at 286 Worthington Street.

Day Baker, who resigned from the General Vehicle Co. last fall to enter the truck business at Boston, Mass., has opened temporary salesrooms at 110 State Street, and later on he will move to the motor district. He will handle three lines to begin with, two electrics and a gasoline truck.

Kisselkar Co. of Rhode Island was formed at Providence, R. I., recently to handle the Kisselkar line in that State, with Gilbert Williams, formerly of the Maxwell branch, as manager.



The above illustration, which pictures the service station of the Wichita Falls Motor Truck Co., in London, Eng., gives a very good idea of garage accommodations in that country. Note the unusual narrow platform mounted on pillars down the center of the building and the stall for each truck. Wichita trucks are made in this country by the Wichita Falls Motor Co., Wichita Falls, Tex. Many Wichita trucks have been exported to England and the continent during the past 2 years, and the building shown above serves as a service station for the vehicles in use abroad. A complete line of spare parts is kept in stock and replenished from time to time by large shipments from this country

A. R. Giffin, formerly connected with the Timken Axle Co., Detroit, and the Studebaker Corp., in the same city, has been appointed production and general factory manager of the Kellogg Mfg. Co., Rochester, N. Y.

Ray T. Middleton, who has been in charge of the Michigan sales for the Steel Products Co.'s plant in Cleveland, Ohio, will also have charge of the sales of the Michigan Electric Welding Co. in Detroit. The lattern concern was consolidated with the Steel Products Co. last summer, and the present change in the sales policy is being made for closer organization and co-operation. The principal products of the Cleveland plant are valve stems, pushrods, spring bolts, king-bolts and other similar hardened or ground parts. The chief products of the Michigan Electric Welding Co. are brake-rod assemblies, drag-links, torque-rod assemblies, starting cranks, headlight brackets, tank straps and other similar chassis work in addition to job welding.

Goodrich Committee Management, installed at the plant of the D. F. Goodrich Motor Co., Akron, Ohio, slightly more than 2 months ago, has increased the efficiency of the organization through the intelligent handling of the various departments. The responsibility has been taken largely from one man and put on a committee of ten. The company has more than 50 departments, each making a number of different rubber products, and the committee plan relieves the president and his board of directors of a great deal of detail work. The ten men selected to form the committee are as follows: H. E. Joy, director of costs and factory goods; W. O. Rutherford, director of sales; H. K. Raymond, director of production; A. B. Jones, director of plant administration; Dr. W. C. Geer, director of development of goods and processes; George Owenslager, director of chemical laboratories; W. A. Means, treasurer; A. P. Lohman, engineer; H. C. Miller, manager of tire sales, and W. H. Yule, manager of sales of general mechanical rubber goods.

W. J. Slater, formerly manager of the sales promotion department of the Firestone Rubber Co., Akron, Ohio, has been promoted to a special representative of the sales department of the same concern.

Daniel C. Swander, who was sent to Boston, Mass., to take charge of the New England branch of the Firestone Tire & Rubber Co., Akron, Ohio, was tendered a big reception by the office force when he arrived in Boston last week to take over the affairs of the company.

John O. Heinze has joined the Sims Magneto Co., East Orange, N. J., as engineer and production manager. He was formerly identified with the John O. Heinze Co., Springfield, Ohio, and previous to that was chief engineer of the Northway Motor & Mfg. Co.

C. C. Bradford, for several years sales manager of the U. S. Light & Heat Corp., Niagara Falls, N. Y., has resigned. His future connections are not known at this writing.

Directors of the Motor and Accessories Manufacturers were elected at the thirteenth annual meeting of the association at the Waldorf-Astoria, New York City, on Jan. 10. E. J. Wetzel, C. W. Stiger, J. H. Foster and W. O. Rutherford were re-elected directors, to serve for 3 years.

Otto Bruenauer, for 5 years with the Gurney Ball Bearing Co., has become associated with the U. S. Ball Bearing Mfg. Co., Chicago, as engineering manager. He will assume his new position on Feb. 1, and will have full charge of all engineering and development work, supplementing that performed by E. B. Fleish, sales manager, and Howard L. Spohn, commercial manager, each of whom become associated with the U. S. company on Jan. 1.

S. K. F. Engineers, including J. B. Castino, tractor engineer; C. C. Welch, tractor representative of the S. K. F. company for the State of Michigan, and A. J. Gillespie, representative for the middle West, were present at the sales convention of the Dauch Mfg. Co., Sandusky, Ohio, on Wednesday, Jan. 3. Mr. Gillespie delivered an illustrated address on the application of ball bearings to tractors.

F. W. Anderson, formerly assistant chief engineer of the Remy Electrical Co., Anderson, Ind., and previous to that a designing engineer with the Dayton Laboratories, Dayton, Ohio, has recently

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become associated with the engineering department of the Eisemann Magneto Co., Brooklyn, N. Y.

A Vacuum Oil Co. Bonus has recently been granted to many of the company's employees at the Rochester, N. Y., branch. All salaried workers not receiving more than $300 a month are benefited. The compensation is based on a sliding scale from 5 to 25 per cent of the yearly salary received. The adoption of the plan coincides with the fiftieth anniversary of the company, founded in 1886 by Hiram B. Everest.

Thermoid Motor Vehicle Products, made by the Thermoid Rubber Co., Trenton, N. J., are well described and illustrated in a 32-page booklet issued by that company. The line of rubber articles manufactured by the Thermoid Rubber Co. includes pneumatic tires and inner tubes, brake linings, brake and clutch blocks, motorcycle V-shaped brake linings, radiator hose, fan belts, rubber spring bumpers, pedal pads and rubber tubing of all kinds. The book is well illustrated and has an index at both front and rear. Each index is arranged alphabetically, according to the product specified, and makes it easy to find a description of the company's offerings in any particular line as illustrated in the booklet.

Wisconsin Motor Mfg. Co.'s Bonus System will pay such employees as are on the payroll of the concern on Jan. 1, 1917, and who continue in the employment of the company during the year, a bonus of 10 per cent of each employee's total earnings for the year. This bonus will be paid in four parts, as follows: 2½ per cent of the earnings for the first quarter, payable at the end of that period; 5 per cent of the earnings for the first 6 months, less any sums previously distributed; 7½ per cent, less any sums previously distributed, at the end of the first 9 months, and 10 per cent of the earnings for the year 1917, less sums previously distributed, payable Dec. 1, 1917. Employees entering the service of the company between the first and fifteenth days of any month of any quarter will be able to participate in the extra payments, commencing at the rate fixed for the first quarter. Those employees who enter the service of the company after the fifteenth day of the first month of any quarter will not be eligible to participate in the bonus until the next succeeding quarter. Employees who are discharged, or who leave voluntarily, forfeit the right to any extra payments not already received up to the time of leaving. The percentages as given above are calculated upon the total actual earnings of any employee during the periods indicated, and are not based upon the hourly rate.

Edison Batteries for Mercury Industrial Tractors is the title of an eight-page booklet just issued by the Edison Storage Battery Co., Orange, N. J., describing the Edison battery briefly but more particularly the many uses to which the small electric industrial tractor may be put. The Mercury tractor is a three-wheeled vehicle made by the Mercury Mfg. Co., Chicago, and especially adapted for hauling goods in industrial plants and baggage and similar material at passenger car and freight railway stations and for the haulage of lumber in large yards. The Mercury tractor is featured by its three-wheeled mounting, short wheelbase and the use of a special towing hitch, by the means of which any number of trailing vehicles are made to follow in the tracks of the tractor. By this special hitch a train of from five to twenty vehicles can wind through narrow aisles, around corners, along congested floors and up inclined platforms.

Gramm-Bernstein Motor Trucks for 1917 are described and pictured in a new 32-page booklet just issued by their maker, the Gramm-Bernstein Motor Truck Co., Lima, Ohio. The booklet is 9 by 12 inches, and contains a large number of excellent half-tone illustrations depicting the various units of the Gramm-Bernstein line and the component parts of the vehicles. The complete offering ranges in capacity from 1 to 6 tons, with trucks of 1-, 1½-, 2-, 2½- 3½-, 5- and 6-ton burden. The 2-tonner and the 5-ton unit were new in 1916. All models follow the same general design and are featured by final worm drive and individual-clutch gearsets mounted amidships.

"Your Garage, How to Build It," is the title of a 16-page booklet issued by the National Lumber Mfrs.' Assn., Chicago, and in which are given plans and directions for constructing one-, two- and six-vehicle garages. These garages are to be built of wood and the directions and plans given tell exactly how each one of the various types would be erected and painted and the kinds of woods to be used in each portion of the building. The book should prove of value to those motor truck owners in small cities who operate one or not more than six vehicles.

Convention of the Smith Motor Truck Corp., Chicago, manufacturer of the Smith Form-A-Truck Ford adapter, was held at the Blackstone Hotel, Chicago, on Dec. 27, 1916. The gathering was the second annual convention and lasted for 3 days. The meeting was presided over by E. I. Rosenfeld, vice-president and general manager of the Smith company, and was attended by the sales managers of the company's branch offices and by all of its district representatives.

Brazil and Peru Rubber Exports during November, 1916, amounted to 5,587,716 pounds, compared with 7,540,908 pounds for the same month in 1915. Of these exports, which were shipped principally from Para and Manaos, Brazil, and from Iquitos, Peru, 2,879,044 pounds came to the United States and 2,708,672 pounds went to Europe, as compared with 5,666,009 and 1,874,899 pounds, respectively, in November, 1915.

Motor Truck Makers' Plans and Products in Brief Résumé

(*Continued from page* 50)

larger models frames made of rolled channels. A 3¾ by 5½ motor, with a horsepower of 22.50, is used on each of the three smaller trucks. A 4¼ by 6⅝ motor, with a horsepower of 29.00, is employed on the 5-tonner.

Witt-Will

Two Models Continued—One Price Increase

CONTINUED in two models for this year, Witt-Will trucks, made by the Witt-Will Co., Washington, D. C., are offered in 1 and 2-ton capacity. Last year their capacities were based on the long ton of 2240 lb., one model having a rated capacity of 1 long ton and the other of 2. This year's 2-tonner has been increased $250 in price, from $2,250 to $2,500. Both models are fitted with square-tube, sheet-case radiators instead of the finned-tube, sheet-case type as used in last year's vehicles.

Both trucks are worm driven, and except for the differences noted above are substantially the same as in 1916. Last year's truck design was entirely new for the Witt-Will company, its previous vehicles having had their motors between the seats instead of under hoods, and chain instead of worm drive.

Witt-Will trucks are assembled from standard parts, and are sold almost entirely in the Eastern States. They are offered in the chassis only, and may be purchased on deferred payments on a plan which necessitates an initial deposit of 25 per cent and the balance in secured notes to mature within 6 months.

Electric starting and lighting units may be had on Witt-Will trucks at extra cost. Trailers are indorsed for use with the company's vehicles under favorable conditions, and the trucks are then furnished with suitable draw-bar connections.

Both models follow the same general lines, and have pressed-steel frames of the flexible type and unit power plant motors with dry-disk clutches and three-speed selective gearsets. Each has single ignition, with automatic spark advance and centrifugal governors driven off the motors. In each case the rear springs take the driving torque and propulsion.

Zeitler & Lamson

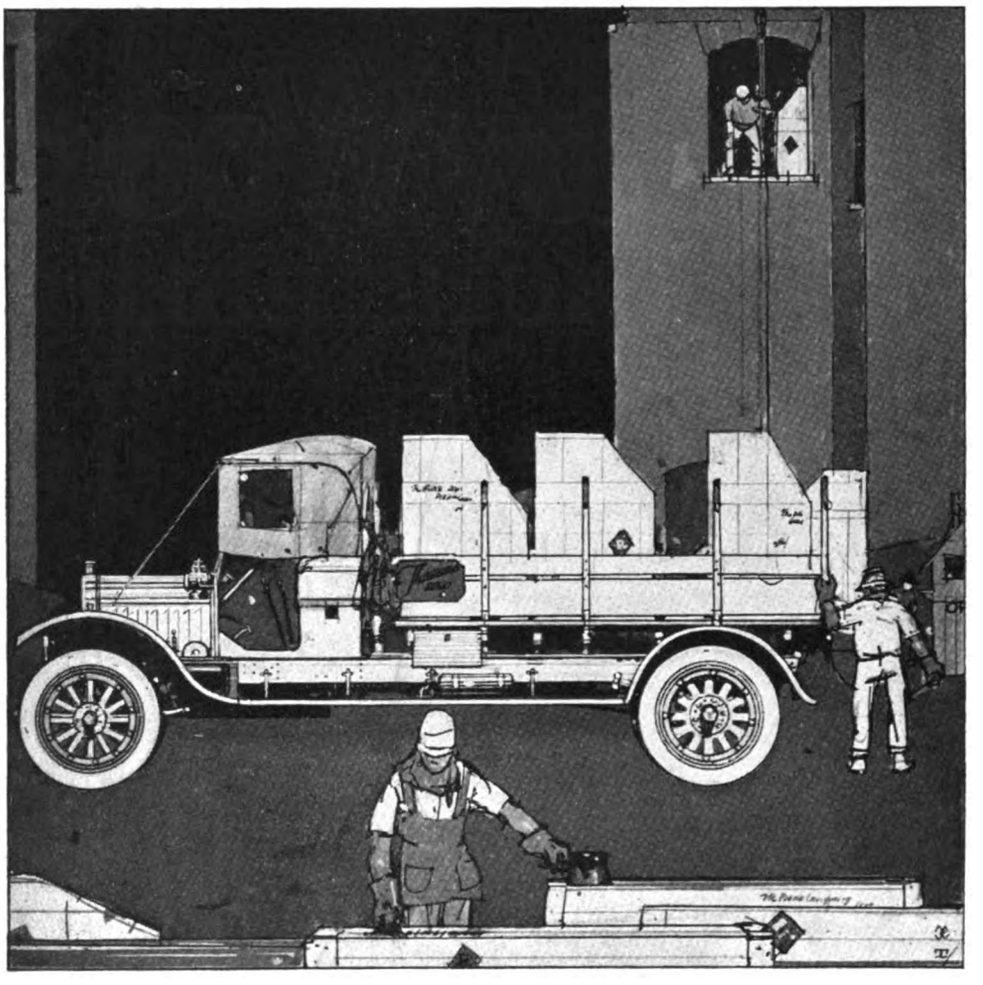
Four Worm Models First Produced in 1916

FIRST offered early in 1916, Zeitler & Lamson trucks, made by the Zeitler & Lamson Truck Co., Chicago, are continued for this year in four models of 1½, 2½, 3½ and 5-ton capacity, of which the 3½ and 5-tonners are new for this year. Last year's two models of 1-ton burden and a 2-tonner have been discontinued. This year's 1½-tonner has been reduced $50 in price, from $1,900 to $1,850, while the price of the 2½-tonner has been increased $250, from $2,200 to $2,450. The 2½-ton model, like all others of this year's line, is equipped with a Vesta lighting and ignition unit as stock equipment, and with a centrifugal governor driven from the motor. Last year's model was not fitted with a governor.

Zeitler & Lamson trucks are assembled from standard parts, and are sold locally to greater Chicago and vicinity included in the territory within a 100-mile radius from that city.

All models are built upon the same general lines. Each has a semi-flexible frame, those of the two smaller models being of pressed steel and the two larger models of rolled channels. All have cellular cast-case radiators, double ignition, with hand-spark advance, Vesta lighting and ignition units. Duplex governors, vacuum gasoline-feed systems, dry-plate clutches, individual-clutch type gearsets, and worm drive, with the torque and propulsion taken through the springs. The motors of the two smaller models are arranged in unit power plants and the gearsets of the larger models are mounted amidships.

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A SIGNIFICANT FACT

While predominating in the total number of motor trucks annually put into service in this country, most of the White output is absorbed by repeat orders from satisfied users—regardless of price competition.

THE WHITE COMPANY
CLEVELAND

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Announcing

"The Baby Wood"

HYDRAULIC HOIST

(TYPE "E")

—the lightest,
—the simplest,
—the most positive,
—the quickest-working

And the **most easily installed** dumping device made;

—the inevitable choice—therefore—of the 1917 buyer of light dumping equipment.

Expressly designed for trucks of 2-ton capacity; but equally adaptable to one and 3-tonners.

Supplied with new special model rear-dump body, forming an ideal combination for every manner of light hauling and dumping.

Weight approximately 250 lb.; requires a space of only 13½ inches between body and seat; body arms are outside of chassis frame.

Made to fit any chassis.

With production about to begin on this new model and every indication of a nation-wide demand, we again recommend that prospective buyers of this type of equipment communicate without delay.

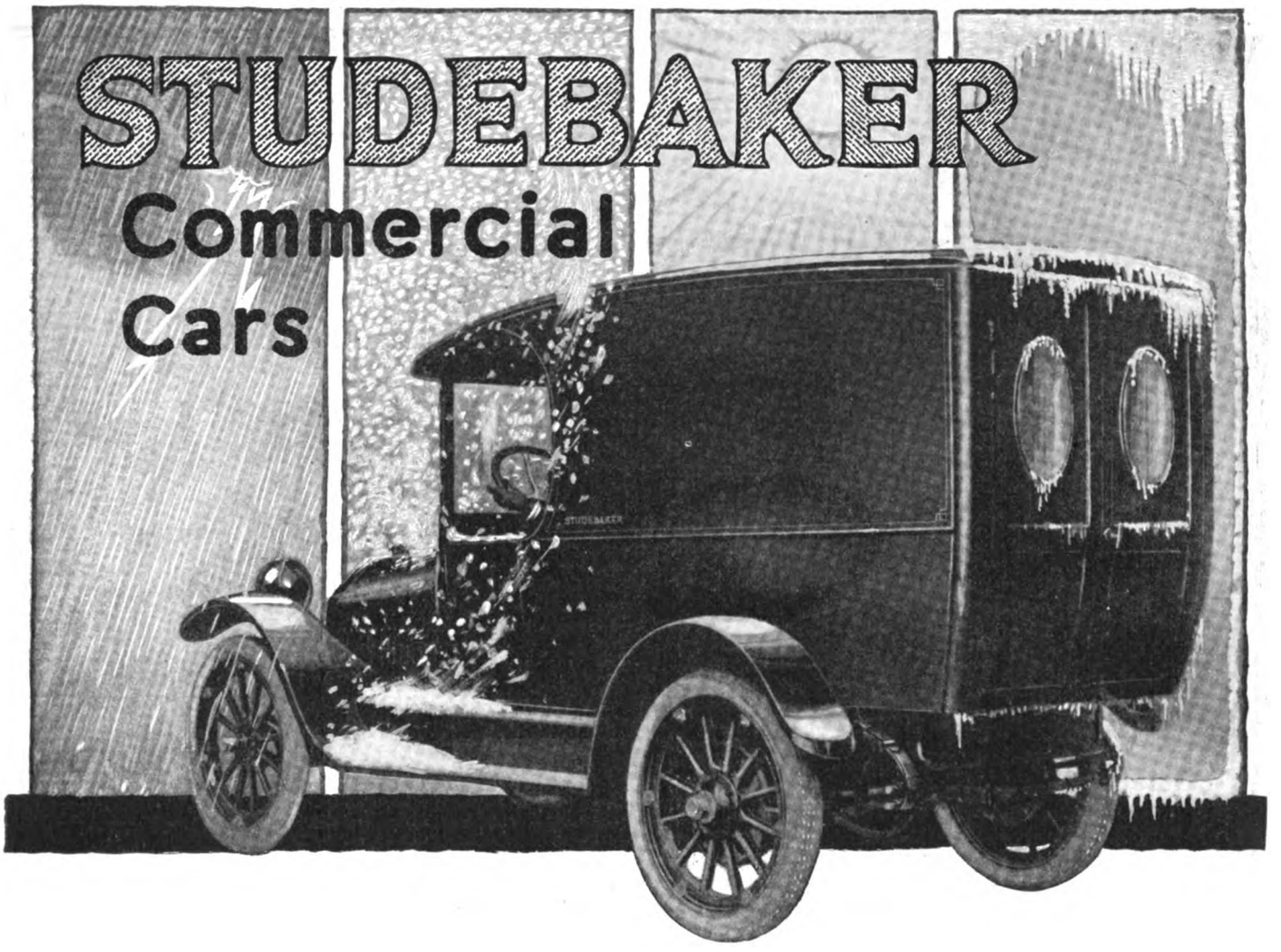
Particulars upon request. Address all inquiries to Detroit.

Wood Hydraulic Hoist and Body Co.

Sole Manufacturers

NEW YORK **DETROIT** CHICAGO

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Every Season Works for the Dealer Who Sells Studebakers!

COMMERCIAL CARS

Half-Ton	
Panel Delivery Car	$925
Express Car -	900
Station Wagon -	925
One-Ton	
Open Express -	$1300
Stake Body -	1350
Bus, 16-passenger	1500

F. O. B. Detroit

Selling Studebaker Commercial Cars is a 365-days-in-the-year Business — with no off-seasons!

Summer when the hot weather weakens a merchant's horses — Winter when the icy winds and the slippery streets makes hauling with horses difficult—Spring with its rainy days and mud—every season offers many unusual opportunities to show merchants the superiority of motor vehicles over horses and wagons.

And when you remember that not one-half of 1% of the market for commercial cars has been touched—and that Studebakers offers the Dealer a COMPLETE line of SIX proved-up cars representing 65 years of experience in building delivery vehicles, you can begin to appreciate what a year-round business in such a market means.

Selling Studebaker Commercial Cars is the GREAT opportunity in the country at this time. It is a chance to BUILD a lasting business in a market that is widening day by day. Merchants are daily dropping other lines of business to take up this opportunity, and we urge every progressive man to write at once for complete information.



STUDEBAKER

South Bend, Ind. Detroit, Mich. Walkerville, Ont.

Address all correspondence to Detroit

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WEST'S CAST-STEEL WHEELS for MOTOR TRUCKS



"Patent Pending"

Are used by America's leading Truck Builders

These wheels were designed by, and are built under the supervision of, experienced engineers. They have been thoroughly tested and have proved they will stand hard usage and abuse.

Over 25,000 WEST'S CAST-STEEL WHEELS are now used on trucks and not one of them has failed to give satisfaction. Specify WEST'S CAST-STEEL WHEELS on every heavy truck you buy.

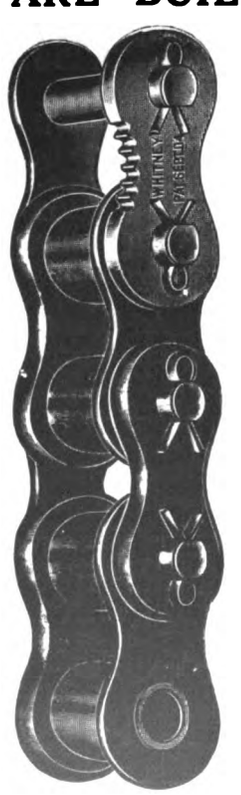
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The West Steel Casting Company

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"Watch the West Cast-Steel Wheels Go Round"

"WHITNEY" Chains
ARE BUILT FOR STRAINS



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Whitney Chains are strong, accurate and dependable. They are used by the leading makers of trucks throughout the country.

Insist on "Whitney" Chains when making replacements.

The Whitney Mfg. Co.
Hartford, Conn.

Chains, Keys and Milling Machines

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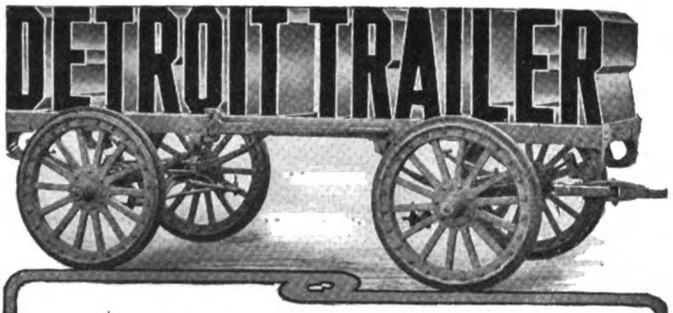
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1½-3-5 and 7 Ton Sizes

DOUBLE end steering device of original design makes it not only possible but EASY to back trailer anywhere. Double swiveled tongue; no other trailer has it.

Also pole, semi, and pleasure car trailers.

Detroit Trailers are used by *Cadillac, Ford, Saxon, Reo, Jeffery* and other large auto concerns who know good trailers when they see them.

MONEY FOR DEALERS

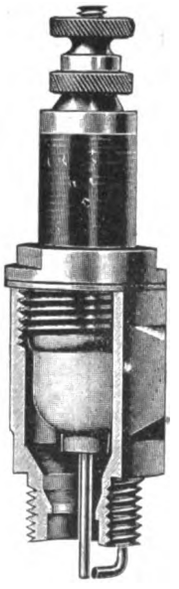
The demand for trailers is increasing rapidly as you know. An agency for a good trailer is a good thing, and an Agency for the Detroit Trailer is the best proposition in the Trailer line.

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SPARK PLUGS

THIS PLUG increases the protection on the engine end of the plug by adding a porcelain cap so arranged and enclosed that it is protected against breakage, and yet gives plenty of air space between the porcelain (within the firing chamber) and the outer brass shell—this renders the chance of short circuiting through carbon formation exceedingly remote. The plug is so constructed that the high pressure due to compression tends to tighten rather than to loosen it. Being practically oil and soot proof, it is especially adapted for use in air cooled engines that use a large amount of lubricating oil.



Specials for Ford, Buick, Overland.

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in stock and to order.





For Block, Roller and High Speed Silent Chains.
New Catalog.

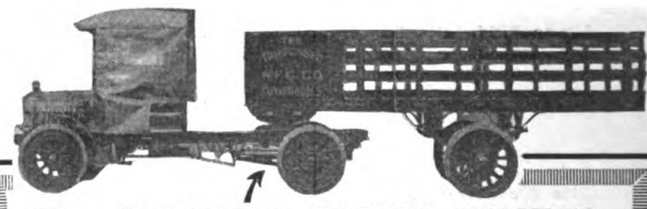
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WANTED SALESMEN

experienced in organizing territory and assisting dealers in closing retail sales for high grade commercial cars. Opportunity for men who can show results. No consideration will be given to applications not giving details regarding former records, connections and salary wanted. Applicants will be protected as to present connections.

Box A50

One-Ton with Three-Ton Efficiency



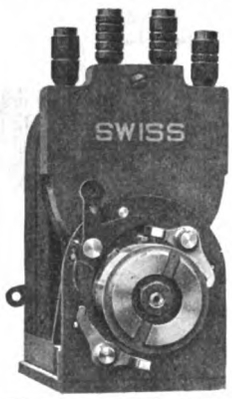
The MARTIN FIFTH WHEEL

makes possible this combination of a 1-ton Packard and a 3-ton Fruehauf trailer.

Write for further information

MARTIN ROCKING FIFTH WHEEL CO.
SPRINGFIELD, MASS.

IN EUROPE THE SWISS



Is Considered
America's Finest
MAGNETO

In America, as fast as we can assure them deliveries, the foremost manufacturers of cars, trucks and tractors are adopting the Swiss Magneto in place of cheaper ignition—regardless of the price of their own product.

The Swiss Safety Starting Coupling absolutely prevents back-kicks from pre-ignition. Exclusive on the Swiss.

Get in line. Write or wire today for particulars. Ask for Bulletin 2.

SWISS MAGNETO COMPANY
MONROE, MICH.

Sales Manager:

A very successful and progressive truck accessory manufacturing company has an opening for a young, energetic, thoroughly wide-awake and experienced Sales Manager. A general knowledge of Truck Engineering problems essential. Excellent opening for the right man. In replying give full particulars as to age, education, experience, names and dates of companies with which employed, married or single, and salary expected.

Address reply to Box No. A-54, this office.

GUARANTEED FORGINGS

WORCESTER MASS. **WYMAN & GORDON** CLEVELAND OHIO

FRAMES

THE PARISH & BINGHAM CO
CLEVELAND OHIO

Our entire engineering force is at your disposal.

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Here Is an Opportunity

A well-known middle-west truck company is looking for an ambitious young man for its engineering department. He should be a technical school graduate, although this is not an absolute requisite. He should be willing to work with an eye to the future. His compensation will be commensurate with his ability. If he can convince us that he is the man we want, we have a place where opportunity is unlimited. Write Box A-52, care of this publication.

BOSCH MAGNETO IGNITION

Most trucks use magneto ignition. The best trucks use Bosch Magnetos. Let us tell you about it now.

Write for Magneto Data.

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213 West 46th Street New York



$675 Open Express Body

The **CORLISS** ½ Ton

$695 Full Panel Body

Light Delivery Truck

Extreme light weight, consistent with carrying 1000-lb. load, makes CORLISS Half-ton Light Delivery Trucks most economical in service.
Carefully selected parts—of known merit and efficiency—make CORLISS Light Trucks a new standard at their price.
Borg & Beck Clutch, Le Roi Motor, Covert Transmission are but the beginning of a list of accepted standards that make up the CORLISS Truck.
Write for catalog and full standard specifications.

CORLISS MOTOR TRUCK COMPANY
Corliss, Wisconsin

THOMAS TRUCKS
BUILT IN NEW YORK

The Thomas is keyed to do things a little better than the best—it has a mission beyond the ordinary. What you know about other trucks is no guide as to what your customers can expect from the Thomas.

The Two Ton Worm Drive

YEARS AHEAD

Dealers—write for specifications and open territory

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Factory and General Offices
639 W. 51st Street, New York City

"BOUND BROOK" (Graphite-and-Bronze) "NIGRUM" (Impregnated Wood) OIL-LESS BUSHINGS

The builders of the best American Trucks are using "Bound Brook" and "Nigrum" Oil-Less Bushings in places where it is difficult to keep bushings properly lubricated.
These Oil-Less bushings are lubricated for life when made, and add thousands of miles to the continuous, unbroken service of trucks equipped with them.

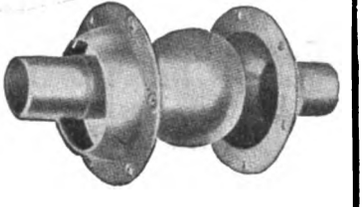
They are a species of TRUCK INSURANCE that is appealing strongly to truck makers and owners all over the country. They need no attention and outlast all other bushings.

All genuine graphited oil-less bushings have always been made at Bound Brook, U. S. A.

BOUND BROOK OIL-LESS BEARING CO.
Specialists in the Manufacture of Oil-Less for more than a Third of a Century
BOUND BROOK NEW JERSEY

BOSSERT

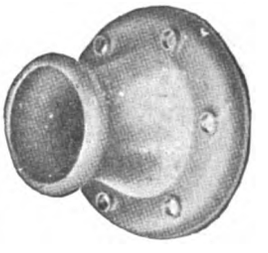
In the most perfect plant that brains, money and experience could devise, we have the men and equipment to produce pressed steel parts in any quantity on comparatively short notice.



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"THE BOSSERT WAY"

stands for the prompt delivery of your order filled in accordance with every item of the specifications.



The Bossert Co.
UTICA
N. Y.

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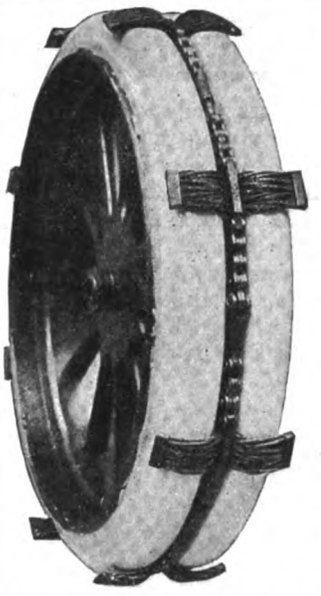
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GENERAL MOTORS COMPANY
TRUCKS

This trade mark stands for a complete line of trucks *built in worm and chain drive* to meet the varied demands of city and country work—a truck to fit your business.

Send for catalogues today

GENERAL MOTORS TRUCK COMPANY
One of the Units of General Motors Co.
Pontiac, Michigan

Branches and Distributors in principal cities (84)



Prepare Now For Winter!

Don't wait until the real cold weather sets in and the streets are covered with ice and snow, before getting "NEVER - SKIDS" for your motor trucks.

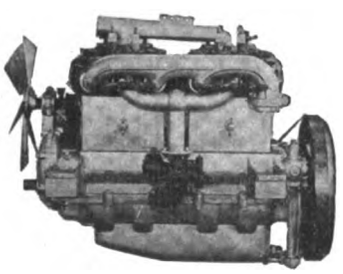
THE NEW TYPE
NEVER-SKID
practically eliminates vibration

Does away with skidding and affords positive traction on slippery streets. The cross-pieces are made of the finest quality woven steel wire — strong enough for the heaviest machines made.

The device can be applied in a few minutes without jacking up the truck, and there is no danger of its catching in driving chains or damaging tires.

YOU WILL SURELY NEED "NEVER-SKIDS" this winter.
Why not get them now?
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New England Distributor: WILLARD B. DAVIS, 39 Danforth Street, Fall River
Chicago Distributor: FRED ALLEN AUTO SUPPLY CO., 1610 S. Michigan Avenue



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BEAVER TRUCK MOTORS are made by men who make nothing but motors—who, by doing the same thing over and over have become masters in perfection. That is why we can make truck motors better, quicker, and at less cost than the truck manufacturer himself.

We make truck motors of all sizes, for all requirements. No matter whether you are building a 1,500 pound light delivery wagon or a 5-ton truck, we can meet your demands for power, economy and dependability.

Do not determine on a motor for your truck till you have sent us your specifications

BEAVER MFG. COMPANY
Milwaukee Wisconsin



Truck Tire Efficiency

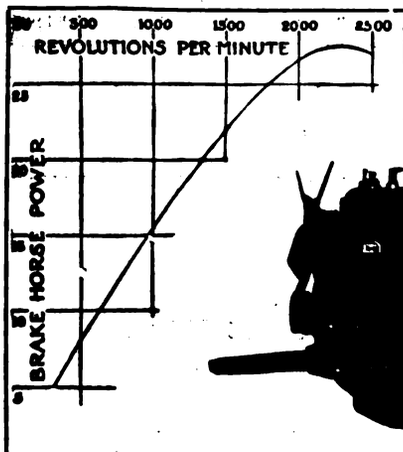
Our new, secret process compound, vulcanized under a pressure of 1,600,000 pounds (almost four times the pressure used to vulcanize ordinary truck tires) has more vitality, rugged strength and durability than any other compound manufactured.

For this reason, United States Solid Truck Tires are the strongest and most durable now on the market.

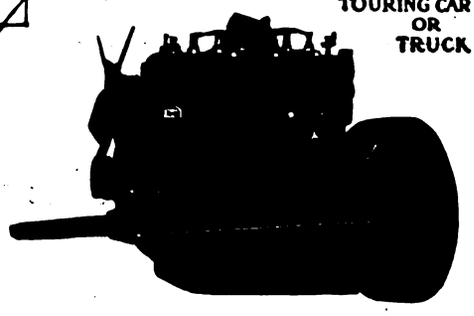
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1790 Broadway, New York City

US
UNITED STATES RUBBER COMPANY
AND ASSOCIATED COMPANIES
RUBBER SYSTEM

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LE ROI MOTOR
3⅛×4½ MODEL C
FOR THE LIGHT ROADSTER TOURING CAR OR TRUCK



The business of manufacturing Le Roi Engines, formerly conducted by Milwaukee Machine Tool Co., is now carried on by

LE ROI COMPANY

Mitchell St. and 60th Ave.
MILWAUKEE, WIS.

Write for Complete Information

CABLE LE ROI MILWAUKEE

"Velvet Mileage"
from
GOODRICH DE LUXE
Truck Tires

To avoid excessive vibration truck users sometimes discard ordinary tires after they have worn down about one inch.

Goodrich DE LUXE tires contain nearly twice as much rubber which must be worn down before they reach that point.

That's why users say they deliver "Velvet Mileage."

B. F. GOODRICH CO.
Akron, O.

"Little Giant"



The Power-Bred Truck

MECHANICAL power is bred into the Little Giant Trucks of today—just as strength and endurance were bred into the Percherons of the past. The Little Giant is lively, responsive, like a fine-spirited horse—yet, like a young Mogul Locomotive, it is dependable twenty-four hours in twenty-four. Thousands of Little Giant owners proudly boast—"it never had a tow-rope on it yet."

THE "LITTLE GIANT" LINE INCLUDES

Model 15—1-ton Worm Drive
Model H—1-ton Chain Drive
Model H—1½-ton Chain Drive
Model 16—2-ton Worm Drive
Special Bodies for Every Purpose

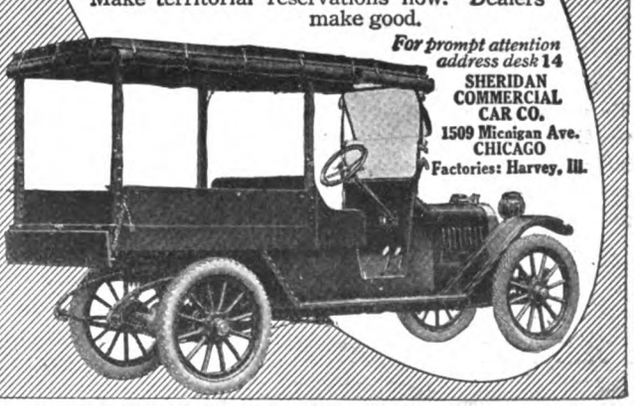
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1085 Fisher Bldg. CHICAGO
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Branches and Service Stations Everywhere

1000 Pound Capacity
Sheridan Commercial Car
Ready for Delivery Now
Fully Equipped Price $540

THE SHERIDAN is the lowest priced delivery car on the market. Thoroughly equipped and properly built to do the work it's designed for—haul 1000 pounds any time—anywhere. Ample in size, load capacity and power.

Sells fast to a big, ready-made field of *buyers.* Not a rebuilt pleasure car. Made a truck through and through by manufacturers of trucks, to replace horses where price is what counts. Chassis alone, **$490.** Fully equipped, **$540.** Write or wire for complete details. Make territorial reservations now. Dealers make good.



For prompt attention address desk 14
SHERIDAN COMMERCIAL CAR CO.
1509 Michigan Ave. CHICAGO
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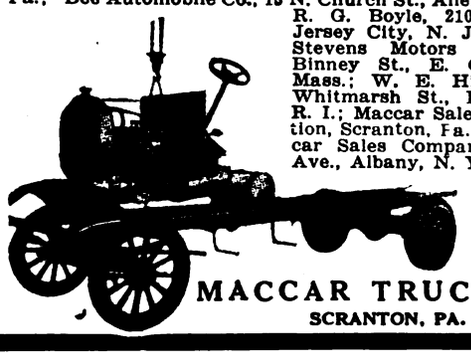
MACCAR

Delays Cost Money

The MACCAR never stays off the road more than 30 minutes, because of power-plant trouble.
If anything happens you substitute a new power-plant—no expensive tying up of your truck for time-consuming repairs.
The motor, clutch, transmission, radiator, pump, magneto, carburetor, dash and toe boards, brake and foot pedals, steering gear and all spark and throttle controls, are assembled dust-proof, in one cradle and as a Unit mounted into the frame.
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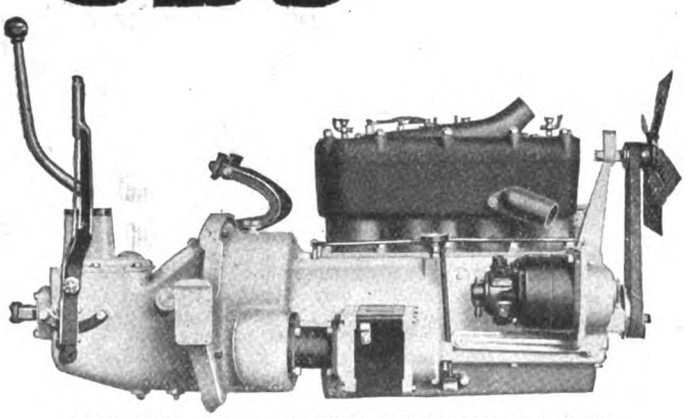
MACCAR TRUCK CO.
SCRANTON, PA.

PIERCE

Leading Manufacturers advertise, as proof of their leadership, the presence of PIERCE GOVERNORS on their trucks.

The
PIERCE GOVERNOR COMPANY
Anderson Indiana

G·B&S motors



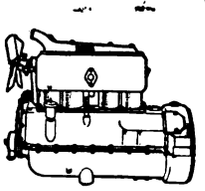
Four Cyls. 3¾ x 4¼—22½ H.P. Three Bearings.

New Chain Adjustment

By a very simple but absolutely certain method the chains on the G B & S motor may quickly be taken up. This one feature indicates the continuous process of refinement that is possible in a factory which devotes its energies exclusively to the production or one type and one size of motor.

This motor has the power, the stamina and the quality that makes it supremely satisfactory in motor truck service. Write.

GOLDEN, BELKNAP & SWARTZ COMPANY
DETROIT, MICHIGAN



REPUTATION: It is one thing to have a reputation and sometimes quite another and a very different thing to deserve one. ESTABLISHED, and therefore deserved, is the high repute of the Buda Motor. It is based on reliable, long-lived, economical, efficient performance, the result of 36 years of the highest grade of manufacturing.

The BUDA MOTOR

is an expression of our one ideal — Quality; and this is attained through conservative engineering plus conscientious workmanship and the fact that —

OUR CAPACITY, though large, has grown solely on the basis of the number of motors we could produce carefully, test thoroughly, guarantee positively. It is kept squarely on that basis. When a BUDA MOTOR goes into your assembly our reputation goes with it. We cannot afford to forget that, and — *neither can you.*

THE BUDA COMPANY, HARVEY, (Chicago Suburb) ILL.

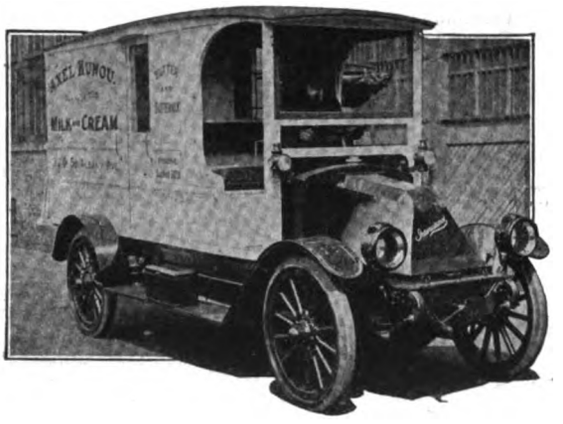
THE BUDA COMPANY BUDA MOTOR The product that the ESTABLISHED 1891

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International Motor Trucks — Profit-Builders

THESE are the trucks of which there are more at work than of any other line of motor trucks made—a remarkable record. This year the factory and output are to be more than doubled to meet the fast-growing demand.

International trucks are popular because for years they have been saving and making money for men who have material and supplies to transport. They will handle **your** hauling rapidly and economically, in the right size and style of tried-out motor trucks, giving day-in day-out service, making the best impression through both appearance and reliable performance—**there** is better 1917 business for you! Then consider these



New Low-Price Internationals

Model H—1500 lbs. capacity, internal gear drive (chassis) $1225
Model F—2000 lbs. capacity, internal gear drive (chassis) 1500
Prices cash f.o.b. factory.

Eighty-nine company branches and thousands of local distributors cater to the needs of *International* owners. Up-to-the-minute service is always at your hand. Write to the address below for attractive folders with all the details and full information. You owe it to the prosperity of your future to know more about the *International* Motor Trucks. *Now* is the best time to write.

International Harvester Company of America
(INCORPORATED)

88 Harvester Building **Chicago U S A**

DIAMOND T
TRUCKS

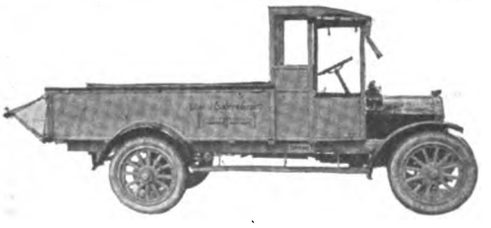
Diamond T Service is as thoroughly built into our ¾-ton trucks, the smallest of the line, as it is in our 3½ ton model.

Its low cost is made possible only by its wide popularity which has enabled us to produce this model in enormous quantities. There has been no cheapening of quality or inferior workmanship permitted in its design or construction.

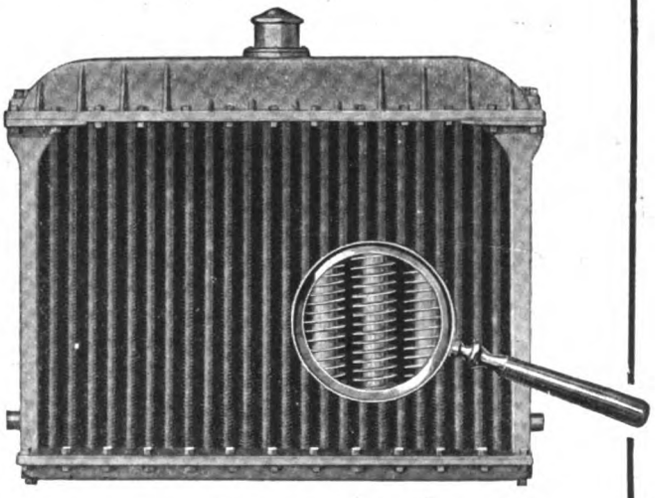
For a thousand uses it is the most satisfactory and economical delivery vehicle ever marketed. With a body suited to your requirements, it will improve your delivery service while lessening your operation expense.

Write to-day for catalog.

Diamond T Motor Car Co., Chicago, Ill.



Seamless Copper Helical Tube Cooling Sections



Are Guaranteed for the Life of the Motor on Which They are Installed

Helical Tube Construction is Accepted as the Best by the Leading Truck Makers of America

Manufactured only by

ROME-TURNEY RADIATOR CO.
ROME, NEW YORK

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In the development of the Electric vehicle,

one of the great problems that arose was that of overcoming the friction and wear of motor bearings and the troubles that naturally followed throughout the power producing and transmitting elements.

In the progress towards perfection, the use of

NEW DEPARTURE BALL BEARINGS

AMERICAN MADE FOR AMERICAN TRADE

has demonstrated the wisdom of the builders who first installed them and of the multitude of those, who, following the lead of the pioneers in the industry, have since installed New Departures in a constantly growing majority of American-made electrics.

Electric Truck Troubles and Means Taken to Eliminate Them

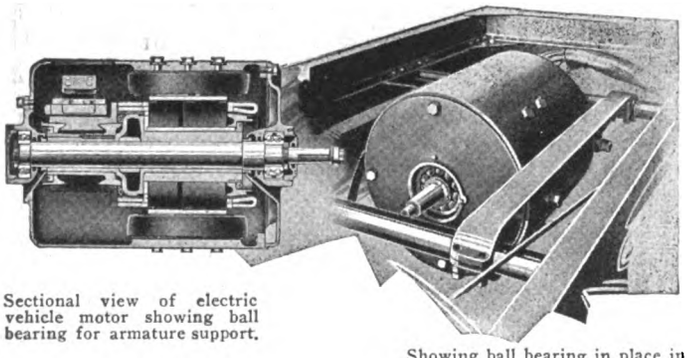
PAPER READ BY F. E. WHITNEY AT CONVENTION OF THE ELECTRIC VEHICLE SECTION, N. E. L. A. AT CHICAGO LAST MAY

...the b... ...ing un... ...charge ...dif-

"*Motors.*—The earlier motors were patterned directly from the street railway motors in use at that time, but, due to the more exacting requirements on account of small gearing and closer limits required, considerable difficulty was experienced with the motors with plain bearings lubricated with grease boxes. The trouble was principally felt on gear-driven trucks, which were in vogue at that time. The wear of the bearings would allow the gears to separate far enough to cause rapid wear and frequent breakage, with the consequent trouble of teeth breaking off and lodging between the gears, bending shafts and doing other damage. With the adoption of ball bearings these troubles were eliminated.

BALL BEARINGS IN COMMERCIAL APPLICATIONS

book that will tell you all about it.
SEND FOR A COPY.



Sectional view of electric vehicle motor showing ball bearing for armature support.

Showing ball bearing in place in motor housing.

THE NEW DEPARTURE MFG. CO.

BRISTOL, CONN., U. S. A.

Conrad Patent Licensee.

WESTERN BRANCH: 818-20 FORD BLDG., DETROIT, MICH.

Distributors in trade centers throughout the United States. Sole British Agents: Brown Bros., Ltd., London and Manchester. For Continental Europe: Jacob Holst, Copenhagen, Denmark.

Standard

MADE IN DETROIT USA

Motor Trucks

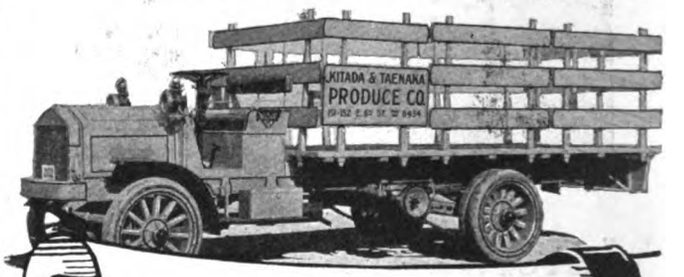
Startled the Motor Truck Industry By a Unique Sales Plan

First of all, the Standard is an unusual truck. It is a powerful combination of many of the world's best-known units—the Continental Motor; Timken Axles; Timken Bearings; Brown-Lipe Gears, and other well-known standard parts

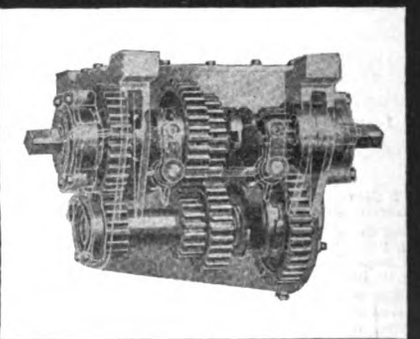
The Standard Motor Truck is sold in an unusual way. Any responsible person can be the agent for the Standard, with absolutely *no investment—no deposit* and *no contract.*

Write for details of this plan. *No obligation.*

STANDARD MOTOR TRUCK CO., 315-327 Bellevue Ave. Detroit, Mich.



COTTA TRANSMISSIONS



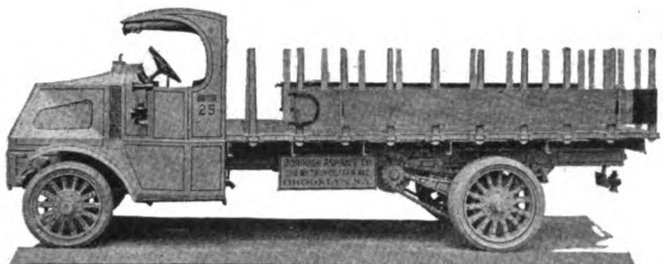
All Gears Always in Mesh

ROCKFORD

An Assurance of Dependable Service

The Cotta Transmission Co.
Rockford, Ill.

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Mack

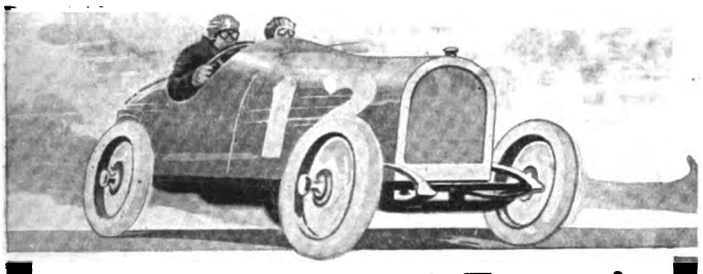
"AC" TRUCKS

THE success of our latest Mack truck is unprecedented both in point of volume and economy of operation.

Our Boston representative reports that new Mack models have been on the road for 20 months, covering more than 25,000 miles under extreme load and road conditions. No owner has yet been obliged to repair even a main or connecting-rod bearing.

Such service is typical of Mack reputation for uninterrupted service and low maintenance costs.

International Motor Company
64th St. and West End Avenue, New York



Faster! Faster! Faster!

Speed—power—they call for *perfect ignition*—a spark so flashing, burning hot that the mixture doesn't matter. Richest mixture to leanest, you'll get a full explosion every time if you have an

EISEMANN
MAGNETO

Just as good at lower speeds, too. Even when your motor is barely turning over, the Eisemann spark is hot and powerful.

EISEMANN MAGNETOS are so dependable and efficient that 108 manufacturers of Pleasure Cars, Trucks, Tractors, etc., have adopted them as standard equipment. That should means something to **you**!



THE EISEMANN MAGNETO CO.
Sales and General Offices
32-33d St., Brooklyn, N. Y.
802 Woodward Ave., Detroit, Mich.



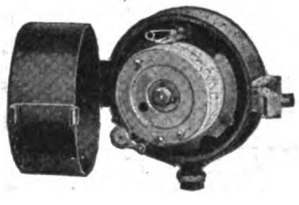
New York Fire Patrols run at top efficiency

The New York Board of Fire Underwriters has an exact daily record of its Fire Patrols. Each is equipped with the

RECORDOGRAF

This instrument shows a complete daily record on a tape of: (1) the time each truck leaves the garage in the morning; (2) the number of stops it makes; (3) the length of each stop; (4) the distance between stops; (5) speed at all times; (6) the total distance traveled per day, and (7) the time it returns to the garage at night.

The Recordograf can be attached to any vehicle. It can't be tampered with without detection. It will do for you what it is doing for these Fire Underwriters and for business firms—give you complete accurate knowledge of your truck operations—enable you to stop the waste.



Our free book tells you more about the Recordograf and about the Dreadnaught Indestructible Hub Odometer, the only hub odometer guaranteed indestructible, even in collision. Write for this book.

AMERICAN TAXIMETER COMPANY
Mfrs. of Jones & Popp Taximeters
1765 Broadway, New York City

SERVICE STATIONS IN THE FOLLOWING CITIES:
San Francisco New Orleans Washington Chicago Detroit Philadelphia Seattle Boston Pittsburgh St. Louis

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AUTOCARS

are equipped with the

"JASCO" TANK

Why? Because demonstrated service facts have proven that this gasoline receptacle makes fuel absolutely safe from fire or explosion and devotes every drop to energy.



"JASCO" TANKS are made of drawn steel. They are seamless, tinned and tested and positively cannot spring a leak even under the most severe conditions. They are money savers, life and property protectors. If your car is equipped with an old fashioned riveted tank you are courting danger. Investigate the "JASCO" today. Full details on request.

The "Jasco" Tank is used and indorsed by the following prominent manufacturers:

PLEASURE CARS

Biddle Motor Car Company, Simplex Automobile Company, Mercer Automobile Company, Lozier Motor Company, Stanley Motor Cariage Company, James Cunningham Son & Company, H. H. Franklin Mfg. Company.

TRUCKS

Baldwin Locomotive Works, Autocar Company, General Vehicle Company, H. G. Burford Company, Peerless Motor Car Company, Garford Motor Truck Company, Gramm Motor Truck Company, Thomas Auto Truck Company, Motor Trucks, Ltd., Canada.

JANNEY, STEINMETZ & CO.

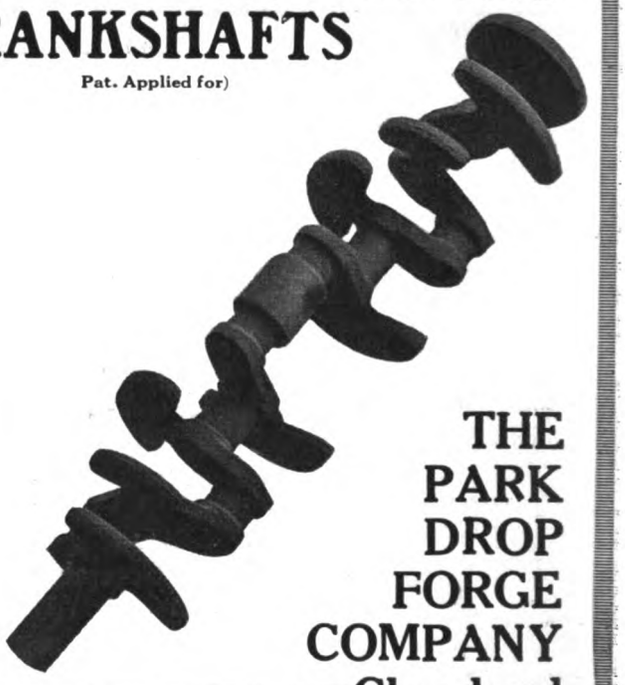
Main Office: PHILADELPHIA

New York Office: HUDSON TERMINAL BUILDING

PARK

COUNTERBALANCED CRANKSHAFTS

Pat. Applied for)



THE PARK DROP FORGE COMPANY
Cleveland



WICHITA TRUCKS

Dependability Plus Service

We want a Dealer with energy and spirit,—we want one who will make the co-operation with him of our factory organization worth our while, and his. We want men who can interest concerns in our heavy-duty trucks and then not let up until they sell them.

If you are such a Dealer we have an interesting selling proposition that will interest you immensely.

Besides the WICHITA 3½-ton capacity truck, we have a 2½-ton and a 5-ton truck—both worm driven.

Write us for our plans.

WICHITA FALLS MOTOR COMPANY

Arthur Boulevard, Wichita Falls, Texas

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FULLER
Unit Power
TRANSMISSIONS

Model
"T U"
¾-1 Ton

Model
"T U 2"
1½-2 Ton
4 Sizes

Particulars sent on request



Eastern Representatives
EARLE & BOGGS
1790 Broadway, N. Y. C.

FULLER & SONS MFG. CO.
Kalamazoo, Mich.

NEVER-LEAK
Copper Asbestos-Filled
GASKETS

Get your estimate on your next gasket requirements. You will be agreeably surprised.

For producing absolutely gas-tight joints nothing has ever been invented to compare with Never-Leak Gaskets. You can protect yourself from all worries over compression leaks if you fully equip your motor with these Copper Asbestos-Filled Gaskets.

The copper gives malleable metal contact surfaces. The asbestos secures a body which retains a powerful spring under compression.

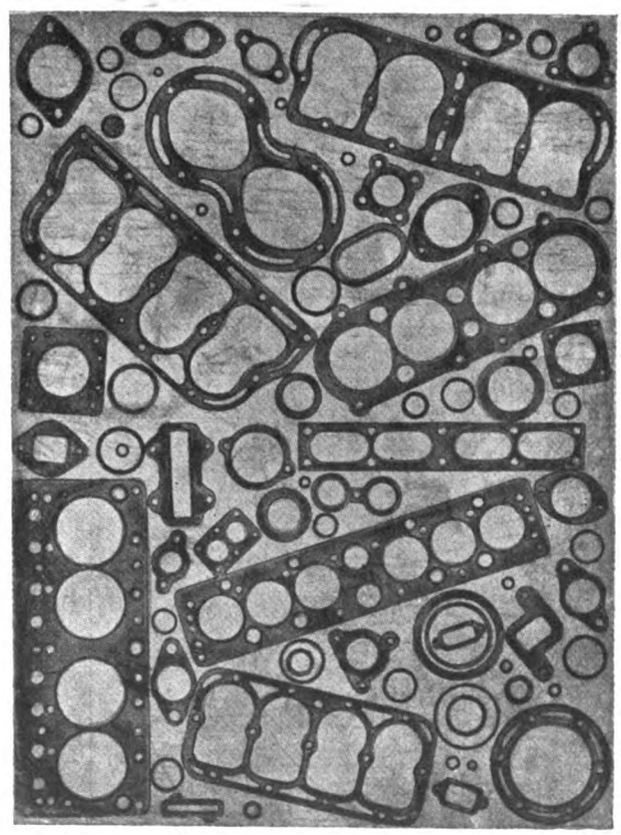
If you have gasket trouble of any nature consult our Engineering Force. This will involve you in no obligation or expense.

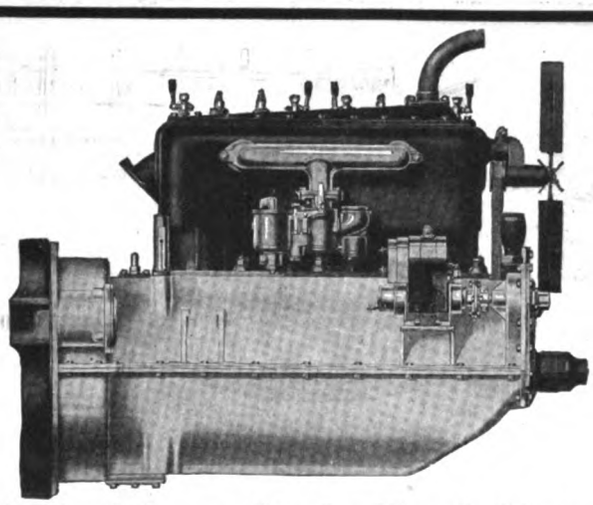
Write for our estimates. We are equipped with many thousand special dies such as here shown and can readily produce the gaskets you need.

Have "Never-Leak" on every gasket.

The Fitzgerald Mfg. Co.
TORRINGTON, CONN.

Gasket Dept.





A Real Long Stroke Truck Motor

Type T U, 4 x 6; Type U U, 4½ x 6; cylinders interchangeable. Crankshaft, four bearing, chrome nickel steel, 2 in. diameter. Bearings, bronze, Fahrig metal lined. Camshaft, one piece, cams integral. Oiling system, force feed, hollow crankshaft.

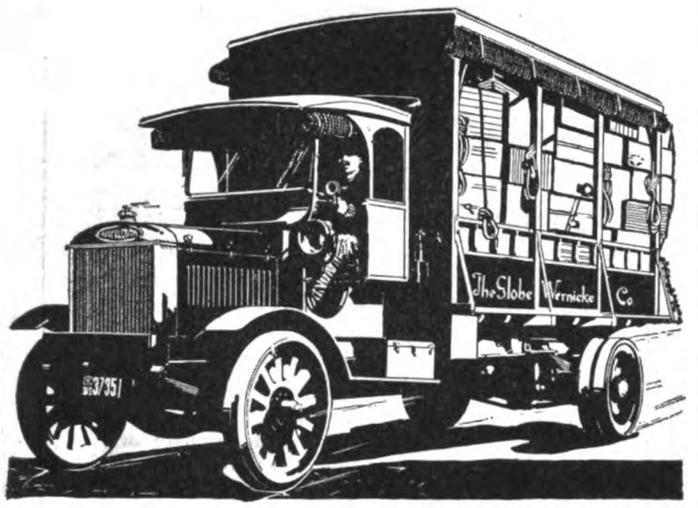
WRITE FOR COMPLETE SPECIFICATIONS.

WISCONSIN MOTOR MFG. COMPANY
Station A, Dept. 319 MILWAUKEE, WIS.

New York Branch: 50 Church Street. T. M. Fenner, Factory Representative. Pacific Coast Representative: Earl P. Cooper Co., 1428 Bush Street, San Francisco; 333 West Pico Street, Los Angeles.

Wisconsin
CONSISTENT Motors

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A TRUCK YOU MUST CONSIDER

There are points in the Armleder Motor Truck which every businessman who plans to buy a truck should know and understand **before he makes his choice.**

They create an above-the-ordinary service and utility that have more than satisfied many hundred owners.

They account for the sturdy durability which cuts maintenance-cost and keeps the truck moving every day.

The Armleder is a specially designed truck. It is **the** truck for **your** work. The best of the well-known construction units are used in its make-up.

Let us tell you in detail what these features are and what they **mean** to you.

Worm Drive

Two-Ton **Three-and-a-Half-Ton**

The O. Armleder Co.

Twelfth, Plum & Charles Sts.
Cincinnati, Ohio

ROSS GEARS

"The Steering Gears that Predominate on Motor Trucks"



Superior design, with enormous bearing surfaces, makes Ross Gears wonderfully easy to operate, with the highest degree of safety and reliability. Quality of materials and excellence of workmanship insure splendid service. Ross Gears are now in use on one hundred and twenty different makes of motor trucks.

Write for catalog and further information.

THE ROSS GEAR & TOOL CO.
750 Heath Street Lafayette, Indiana

We Make It Easier For You to Sell the Easiest Selling Trucks

GRAMM BERNSTEIN

TRUCKS

WE advertise *your* business in *your* own local papers over *your* name at *our expense.*

We send an expert truck salesman whenever or wherever you need him to help you close a sale—at *our expense.*

The Gramm-Bernstein line includes trucks for every prospect's needs—1, 1½, 2, 2½, 3½, 5 and 6 ton trucks. Write for all particulars of our most liberal "Help-the-Dealer" sales policy.

Gramm-Bernstein Motor Truck Co.
13 Gramm Blvd., Lima, Ohio

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Thermoid
HYDRAULIC COMPRESSED Brake Lining—100%

An Overturned Truck

reflects discredit on both owner and maker. However the accident may have happened, many people say: "Careless driver," or "Irresponsible owner," or "Unreliable maker."

Thermoid Brake Lining won't prevent all kinds of accidents, but it most positively will prevent all those that come from slipping brakes—brakes that fail through their lining. Here is a big source of costly accidents eliminated at trifling expense.

Thermoid will grip with friction power even when worn thin as paper. It is one single solid mass, made so by hydraulic compression. By weight it shows 50% more material than any other brake lining. That material is long-fibre Canadian asbestos spun on brass wire and impregnated with a friction compound which is also impervious to heat, water, oil, gasoline or dirt.



Cannot be burned out nor affected by oil, heat, water gasoline, dirt.

Your Guarantee

Thermoid Brake Lining is absolutely guaranteed to give more satisfactory results and to outwear any other lining manufactured. Not affected by heat, oil, water, gasoline or dirt.

Thermoid Rubber Company

Trenton, New Jersey

Makers of a full line of automobile accessories and mechanical rubber goods.

THE KREBS COMMERCIAL CAR CO. CLYDE, OHIO U.S.A.

Real Value

You get the full value of your money and more when you invest in a KREBS Truck.

Guaranteed by manufacturers with 16 years' experience in motor vehicle construction, the KREBS combines Simplicity and Low Maintenance with Efficiency and Reliability.

It contains a simple, powerful Continental Motor, a Timken-Brown Worm Drive, Renault-type Radiator. The special KREBS Carburetor economizes your fuel and the KREBS Automatic Governor protects you against careless-

Krebs

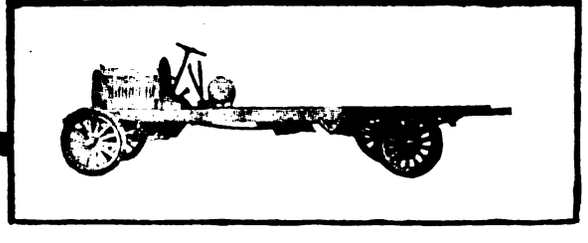
ness and recklessness. The KREBS can be safely entrusted to an ordinary driver.

KREBS Trucks are made in 1½, 2, 3 and 5-ton capacities.

Body to suit requirements.

Send for KREBS catalog.

The Krebs Commercial Car Co.
Clyde, Ohio, U. S. A.



THE MARK OF A BETTER RADIATOR

G & O Radiators for Heavy Duty Service

The G & O Mfg. Co.
New Haven Connecticut

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Handle Your Time Sales on the

Guaranty Time Payment Plan



Guaranty Securities Corporation

Equitable Building, New York City

San Francisco
Hobart Building

Montreal
National Trust Company

"Get the Quality" *Booth* "Get the Quality"

IF you buy felt washers simply by the price, you can always find some that are lower priced than ours. But if you care for quality, service and perfection, BOOTH'S are the lowest priced washers made.

BOOTH FELT COMPANY, Inc.

440-450 19TH STREET BROOKLYN, N. Y.
116-118 South 5th Avenue Chicago, Ill.

NORTH AMERICAN MOTORS

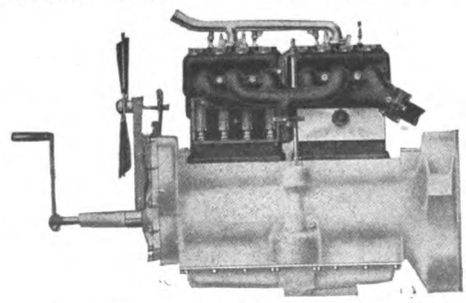
This is to announce two new models which have been added to the "N. A." line. They are: Model C, developing 20-25 H.P., and Model CX, developing 25-30 H.P.

These motors round out a line of power plants for commercial vehicles which are the most thoroughly accessible and simplest truck motors ever designed.

Full information on these new models or on our entire line will be gladly sent.

A Detroit office has been opened at 1325 Dime Savings Bank Building.

NORTH AMERICAN MOTORS COMPANY
Factory: POTTSTOWN, PA.
Detroit Office: 1325 Dime Savings Bank Bldg.



The Universal Automobile Record Book

THE object of THE UNIVERSAL AUTO RECORD BOOK is for the Owners of automobiles to keep an accurate account of all costs pertaining to the operation of their machines in a simple, compact and accurate form.

Through THE UNIVERSAL AUTO RECORD BOOK, if the record is correctly kept, the exact expense of all items can be easily arrived at and any leakage in expenses be corrected.

Through THE UNIVERSAL AUTO RECORD BOOK provision is made for the separate listing of different items of expense, also records of tire mileage, motor trips, etc.

The convenience of keeping the record of the mileage is well worth the price of the book.

THE UNIVERSAL AUTO RECORD BOOK can be carried in a convenient place in the car, either in a door pocket or under the seat or will easily fit into the coat pocket on account of the fact that the book is only 5¼" wide and only 7¾" deep.

There can be no question but that the keeping of a Record Book along the above lines would prove not only of real interest to every car owner, but will also add pleasure to the operation of the machine, and at the same time will afford a saving in the cost of operation.

THE UNIVERSAL AUTOMOBILE RECORD BOOK will be sent postpaid to any address upon receipt of 50c.

COMMERCIAL VEHICLE
239 West 39th St., New York

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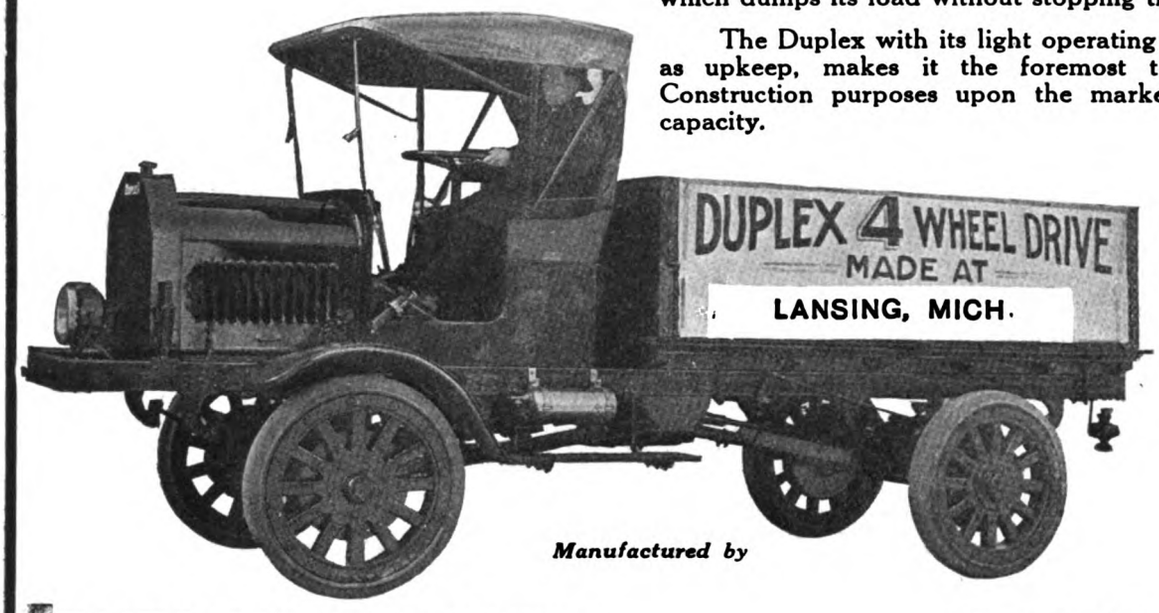
DUPLEX 4 WHEEL DRIVE

THE TRUCK OF EARNING EFFICIENCY

This cut represents the Duplex 4-Wheel Drive Road Truck, and is one of many others hauling one hundred and fourteen yards of gravel every twenty-four hours, a distance of 7.7 miles and at $1.00 per yard, earns $114.00 per day.

This truck with trailer has Duplex Side Dump Body which dumps its load without stopping the truck.

The Duplex with its light operating expense as well as upkeep, makes it the foremost truck for Road Construction purposes upon the market regardless of capacity.



Made in two- and three-ton capacity

Manufactured by

DUPLEX TRUCK CO., Lansing, Mich.

One Thousand Miles on High Gear

OVERLOADED 20 PER CENT.

Every hill on this route through Ohio and Michigan was taken on high without straining. Read the story in our booklet "The Wizard of Trucking." Only a Six and only a "Globe" could do it on 12½ miles per gallon of gas.



Six Cylinder Motor

trucks handle like a pleasure car. Start easier. On high 1½ miles to 25 miles per hour. 11 to 15 miles per gallon of gas. Quieter operation. Minimum motor vibration. Go anywhere, any roads, any time. Agencies being established rapidly. Write today.

MFG. BY

THE GLOBE MOTOR TRUCK CO.

NORTHVILLE, MICH.

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ACME
THE TRUCK OF PROVED UNITS

Know Why the Most Successful Truck Dealers Want This Plan!

Faster Sales—Less Expense—Bigger Profits

Is your territory still "open?" Wire today to know—this is your great, immediate opportunity. Offers quicker, greater profits for all of 1917! Keen dealers all over the country instantly endorsed it. It's a tremendous opening for you provided some alert competitor hasn't already closed it.

Established merchants who wired at our previous announcements were astonished at the unusual features of the offer! They now know it's no ordinary agency proposition. It's an actual expense reducing offer—and Acme Trucks—big—powerful—proved—SELL THEMSELVES.

WIRE for Reservation and Details of Plan

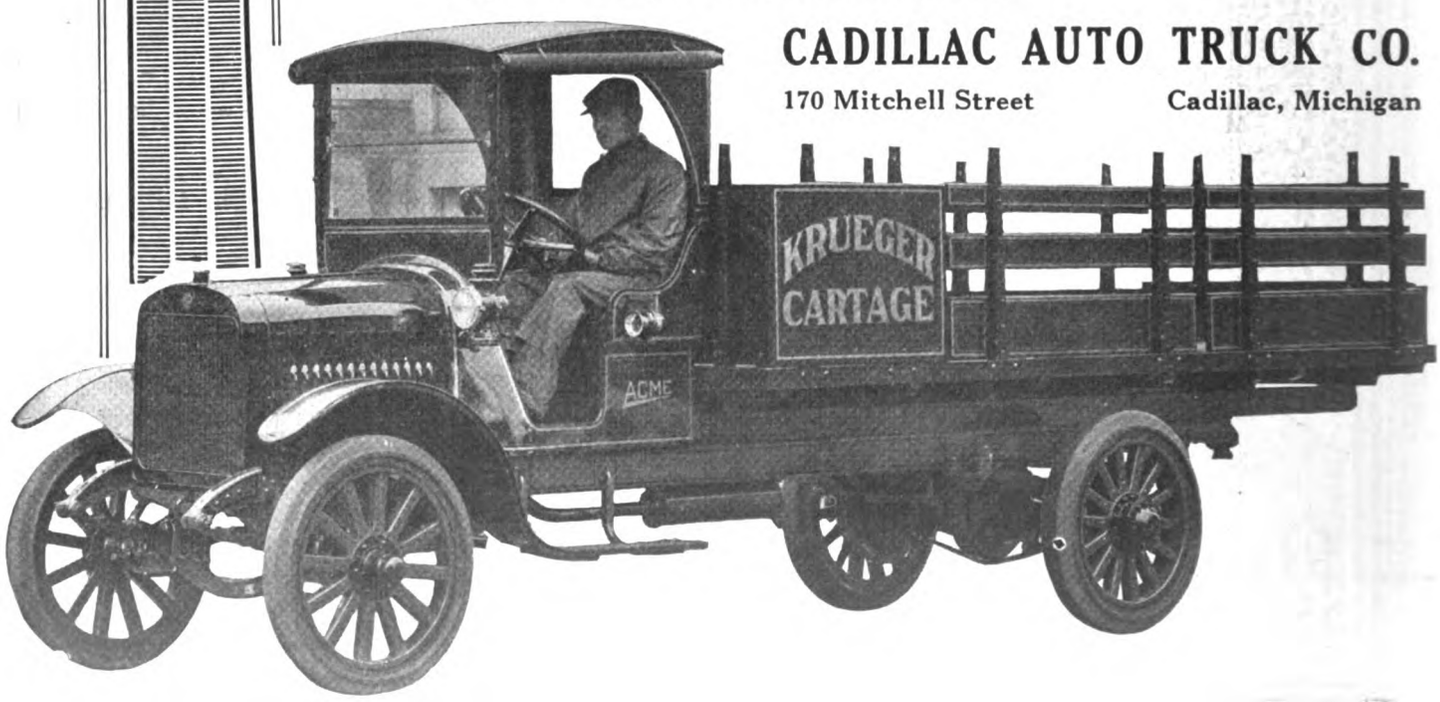
You may yet be able to cash in on our new offer. This is the third announcement and you who seek bigger business need to act quickly. Wire us to reserve your territory. Then study the plan and prove its dollar-saving worth. There's tremendous factory co-operation behind it. For instance, we are going to CONCENTRATE OUR ADVERTISING IN OUR DEALERS' LOCAL PAPERS. That's only one feature.

Acme Trucks are of PROVED UNIT construction—Continental Motor, Timken Axles, Bearings and Worm Drive, etc. Take the 2-Ton Acme for example: 40 H. P. Motor, 148-inch wheelbase, full floating rear axle, easy clutch, 16-inch brakes; chassis 217½ inches over all. Economical in use of oil and gasoline. Your "prospect" CAN SEE THE SERVICE BUILT RIGHT IN THE TRUCK!

Thousands will read this announcement. WIRE and protect your own interests. Your strongest competitor may be interested. WIRE and beat him to it. Get this big plan. Means QUICKER, BIGGER PROFITS.

CADILLAC AUTO TRUCK CO.

170 Mitchell Street Cadillac, Michigan



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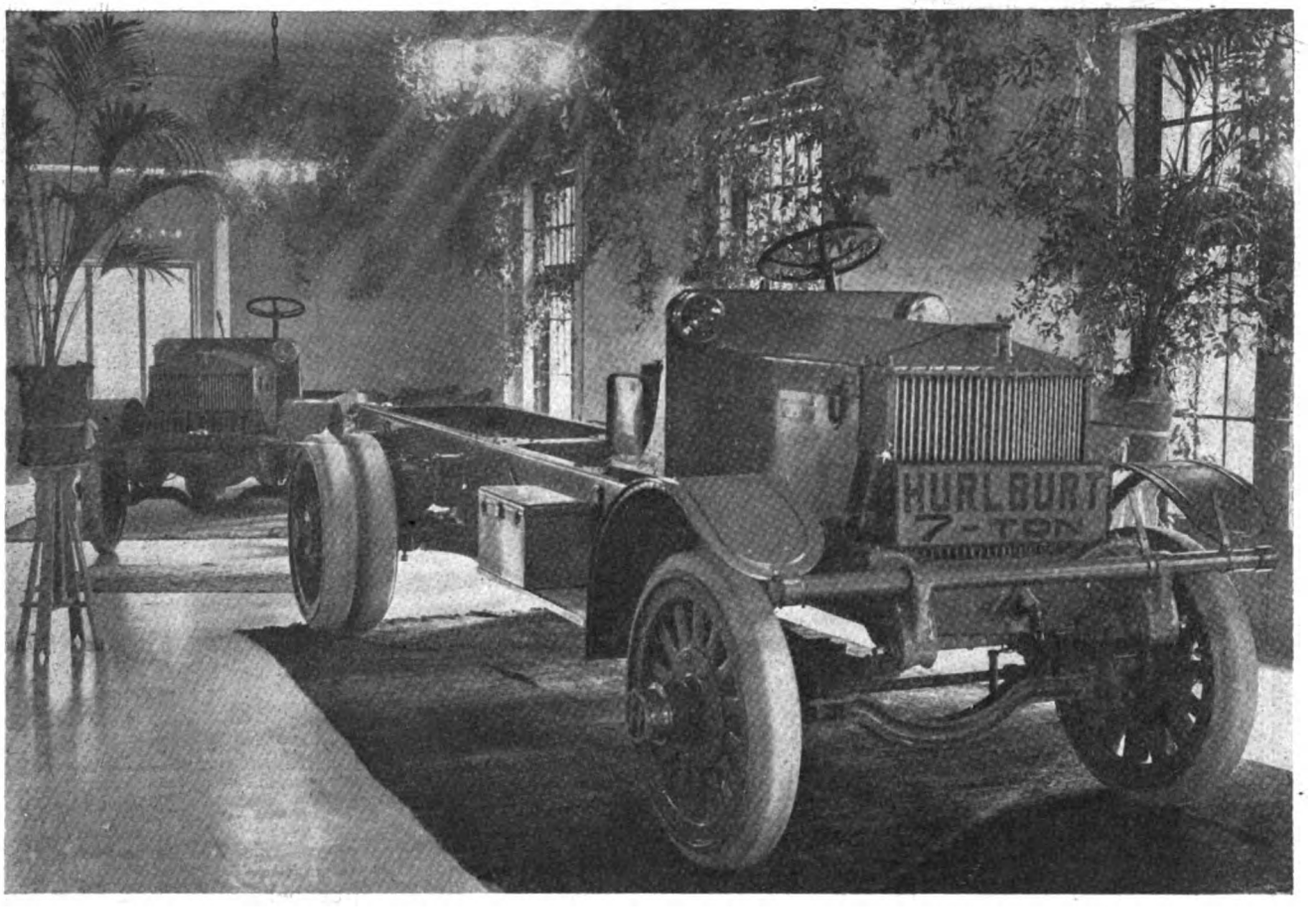


Exhibit of HURLBURT TRUCKS 3½-Ton and 7-Ton at the BILTMORE HOTEL, New York, during SHOW WEEK

AN EYE-OPENER

for Truck Dealers and Users

MOST CONVINCING PROOF of the fact that Hurlburt Trucks are their own best salesmen was given during show week at the Biltmore.

TWO MASSIVE HURLBURTS—3½-ton and 7-ton models—were on exhibition, constantly surrounded by an interested and admiring throng.

THE WORD HAD ALREADY GONE FORTH about the remarkable showing of this truck in New York City, replacing, in the hands of many of the largest and best known business houses and corporations, other trucks even of the most distinguished makes.

LOWEST COST OF OPERATION WAS THE REASON, and a more popular one would be hard to find.

THE TRUCKS THEMSELVES exhibited so pleasingly and in such a perfect location for inspection by those most interested, made an unusually strong and convincing impression.

THEY SOLD THEMSELVES to all who examined their unequalled make-up.

This exhibit was a veritable Eye-Opener to Dealers and Truck Owners alike. If you are a dealer and did not see it, write at once for literature.

SEND FOR DE LUX CATALOG

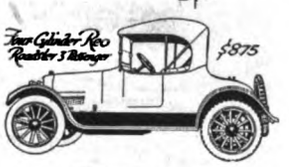
Hurlburt Motor Truck Company

Third Avenue and Harlem River **New York City**

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Reo

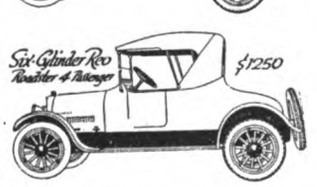
A Complete Line and —a Consistent Policy



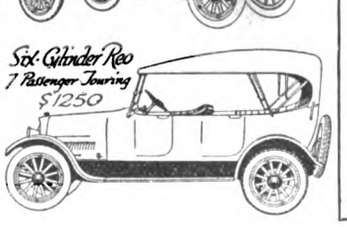












CONSIDERED FROM THE dealer's standpoint, the Reo proposition is ideal.

THE SUCCESS OF REO DEALERS is conclusive evidence of that.

THE VERY TENACITY with which distributors and dealers hang onto the Reo line shows that experience bears out what deduction would indicate.

EVERY DEALER WANTS as complete a line of pleasure cars as possible. But in most cases this can only be secured by handling several different makes of cars, each representing a different—and frequently a contradictory—policy.

YOU HAVE TO DEAL with several sets of men whose ideas of business—of engineering—of manufacturing, and of selling—differ radically.

OR, IF YOU DO get a line of pleasure cars that covers different price classes, you find yourself talking one type of motor or principle in design to one customer, another to the next—and still another to the third!

YOU ARE IN THE POSITION of a preacher who tries to expound three doctrines—but can't segregate his audiences! What he tells one, all hear.

RESULT: HE "SELLS" NONE of them—they go to another church where the man can be consistent even if not sincere, in his adherence to one brand of theology.

THEN AGAIN: Nine times out of ten, when a concern makes several models you find that one model is always pulling—another dragging.

DOES THAT SOUND FAMILIAR?—No need to elucidate further to experienced automobile merchants on that point!

AND STILL AGAIN—in those rare cases where a maker does produce several models of pleasure cars that do not conflict—still you have to go to another maker to get a line of motor trucks.

AND MOTOR TRUCKS now are considered by all live dealers, a necessary part of a complete line.

THIS REO LINE COMPRISES motor trucks as well as pleasure cars—ten models in all. And every model a known, recognized—conceded—leader in its class.

NO REO MODEL DRAGS—none has to be pulled along by a more popular one. All Reos enjoy a chronic overdemand.

THE DEALER WHO HANDLES the Reos has, in reality, three complete lines—two of pleasure cars, each made in four models; and two motor truck lines, that, working separately or in unison, perform fully 80 per cent of all trucking service.

HE CAN GO OUT AND COMPETE with the best in these several lines—and feel he has the best made in all of them.

THIS LINE IS UNIQUE in that all models—trucks and pleasure cars—are designed by the same men; made by the same men; sold by the same organization.

THE REO LINE REPRESENTS the same ideas in engineering—the same ideals in manufacturing and merchandising.

WHEN YOU TALK REO you talk the line—every word you say about one model applies to all.

EVEN THE SIX AND THE FOUR do not conflict. The one is ideal for its purpose—a seven-passenger touring car or Sedan, or for a luxurious big touring roadster—that's the Six.

THE REO FOUR APPEALS to the biggest and best class of buyers, those who want a real automobile—a big, commodious, honest-to-goodness five-passenger motor car or business roadster—at less than $1,000.

SO YOU SEE this line represents as none other does—none other, mind you—those factors every dealer desires in the line he handles.

AND ON TOP OF THAT it represents the highest ideals; the soundest policy; the best engineering, and the best quality throughout. That, every dealer knows.

WE SELDOM CHANGE, we Reo Folk. Never until we are convinced the present Reo representative never will measure up to the Reo standards. Or, as occasionally happens, to get one who will represent the full line instead of making it necessary for us to have two Reo men in the same territory.

IT'S A GOOD IDEA THOUGH to get, and to keep, in touch with the Sales Department. Things may be developing that you don't see on the surface, right in your own bailiwick.

AND YOU MIGHT SECURE the plum—the best paying, because the Best line of automobiles and motor trucks made by one concern—backed by the same guarantee.

Reo Motor Car Company

Lansing, Michigan

174-A





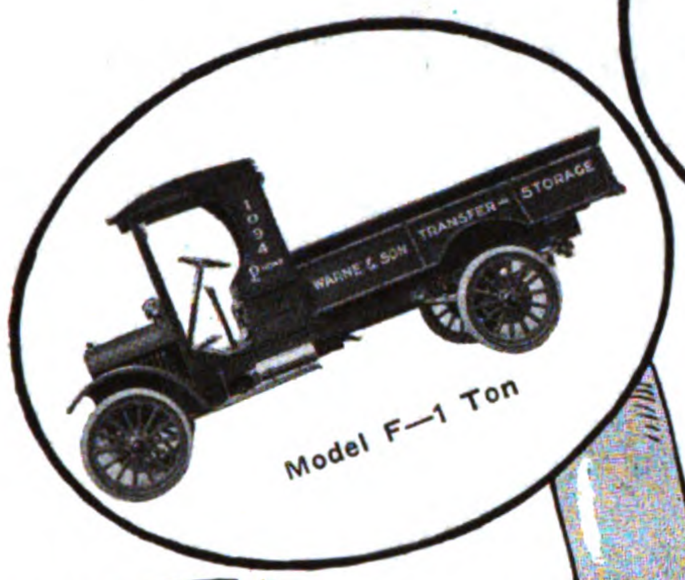


"THE GOLD STANDARD OF VALUES"

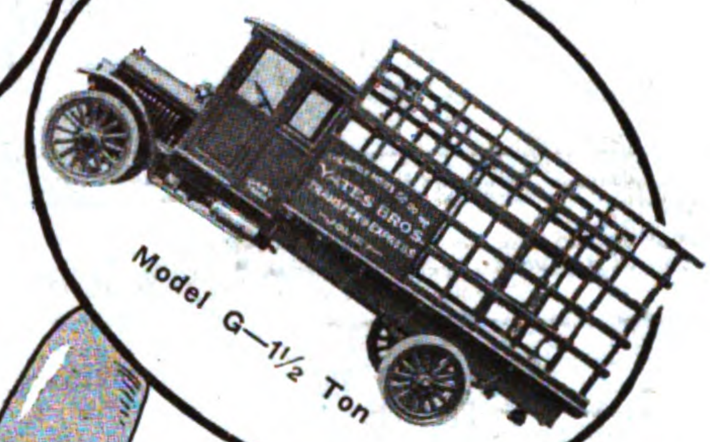
All Prices are f.o.b. Lansing, Michigan

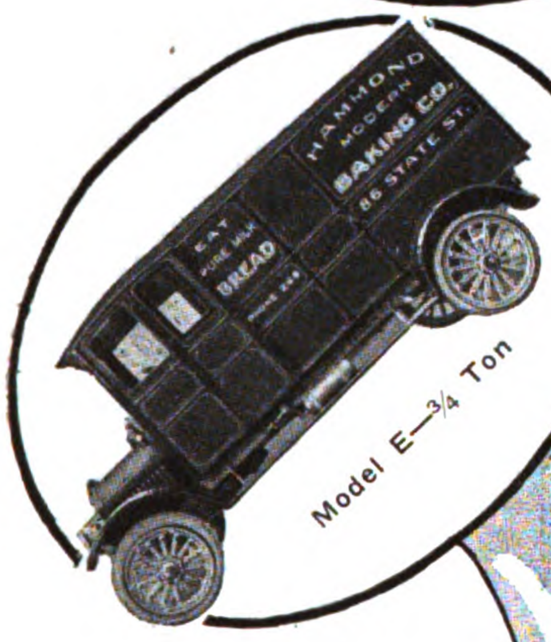
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The New
Gary Model K
3½-Ton Capacity
Delivery March 1, 1917
Write for Advance Information Now

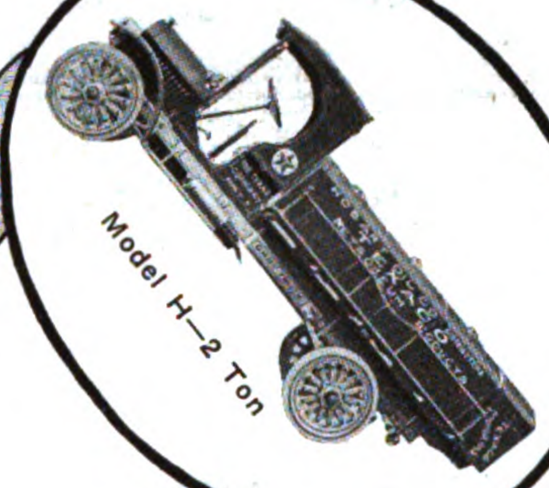


Model F—1 Ton


Model G—1½ Ton



Model E—¾ Ton


Model H—2 Ton

Here Are Five Reasons Why Gary Dealers Make Good

Names You Know in GARY Trucks—

Buda, Eisemann, Stromberg, Raybestos, Goodyear, Sheldon, Fuller, Hayes

Insure Best Service

5 Models
5 Capacities
5 Prices

"Made in the Factories of Experts"

—five selling reasons why **prospective** motor truck purchasers turn out to be GARY **Owners,** and GARY Dealers invariably check up **success, with good profits.**

Gary Worm Drive Trucks

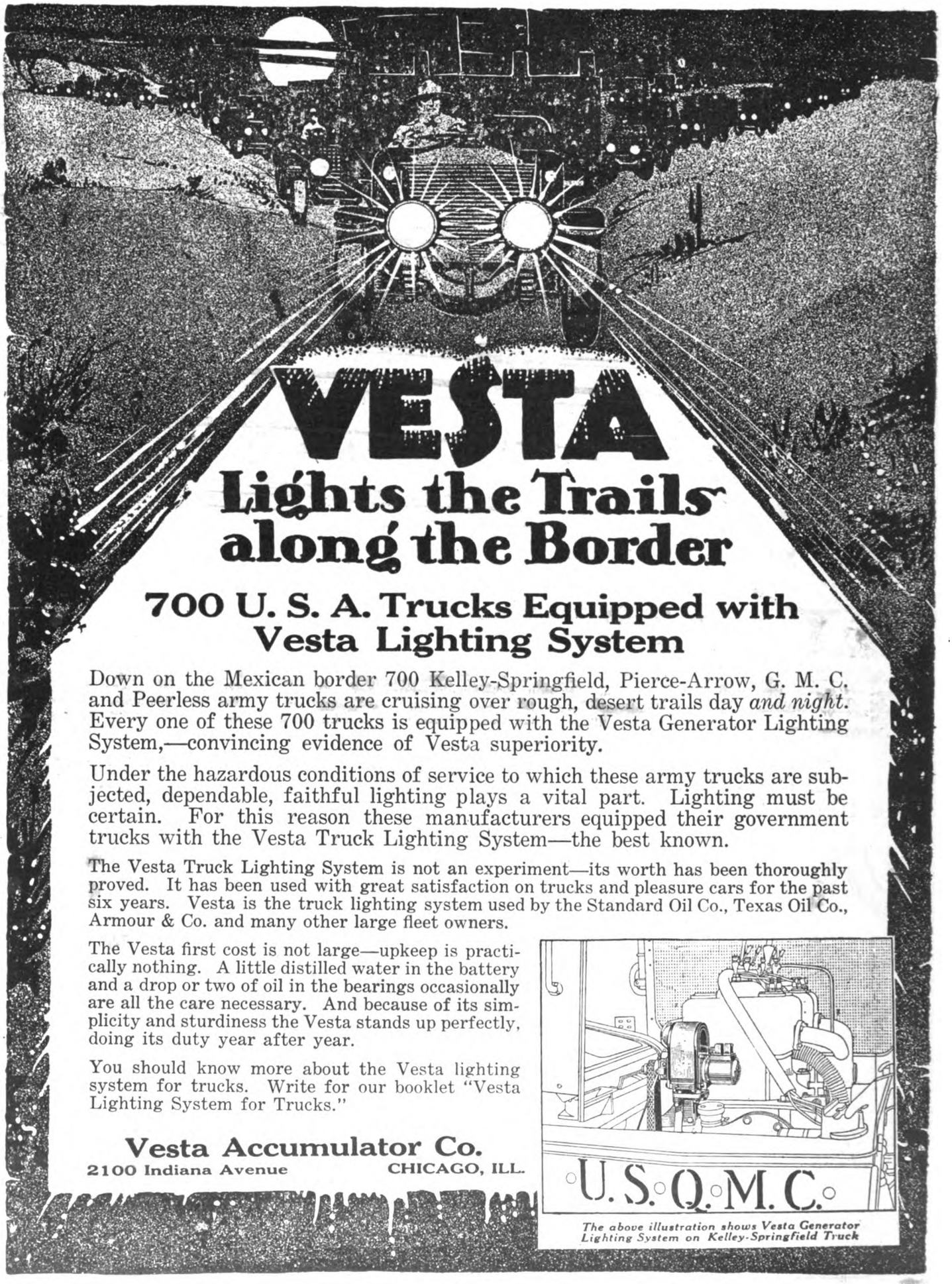
—are a complete, well-rounded line. The current demand for heavy-duty trucks is neatly and completely met in the new 3½-ton Model K. Demands for lighter capacity have consistently been more than satisfied by the other four popular GARY models.

And remember that re-orders constitute a big share of GARY sales.
That is the best proof of satisfaction—and more big business.

Write or wire for complete details—Gary dealers fare well.

THE GARY MOTOR TRUCK COMPANY, :: Gary, Indiana

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VESTA
Lights the Trails along the Border

700 U. S. A. Trucks Equipped with Vesta Lighting System

Down on the Mexican border 700 Kelley-Springfield, Pierce-Arrow, G. M. C. and Peerless army trucks are cruising over rough, desert trails day *and night*. Every one of these 700 trucks is equipped with the Vesta Generator Lighting System,—convincing evidence of Vesta superiority.

Under the hazardous conditions of service to which these army trucks are subjected, dependable, faithful lighting plays a vital part. Lighting must be certain. For this reason these manufacturers equipped their government trucks with the Vesta Truck Lighting System—the best known.

The Vesta Truck Lighting System is not an experiment—its worth has been thoroughly proved. It has been used with great satisfaction on trucks and pleasure cars for the past six years. Vesta is the truck lighting system used by the Standard Oil Co., Texas Oil Co., Armour & Co. and many other large fleet owners.

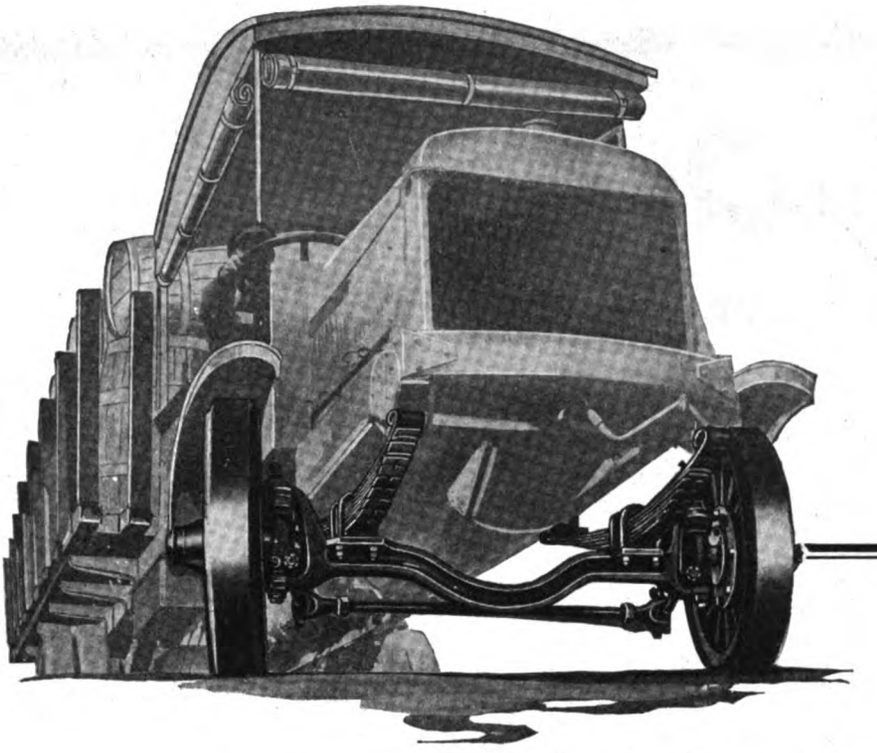
The Vesta first cost is not large—upkeep is practically nothing. A little distilled water in the battery and a drop or two of oil in the bearings occasionally are all the care necessary. And because of its simplicity and sturdiness the Vesta stands up perfectly, doing its duty year after year.

You should know more about the Vesta lighting system for trucks. Write for our booklet "Vesta Lighting System for Trucks."

Vesta Accumulator Co.
2100 Indiana Avenue CHICAGO, ILL.

The above illustration shows Vesta Generator Lighting System on Kelley-Springfield Truck

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Between the Load and the Road

are the Axles and Springs, the parts that determine whether the truck is going to "get there" with its load, and how much it's going to cost to do it.

Do you realize, Mr. Truck Driver, that these three factors

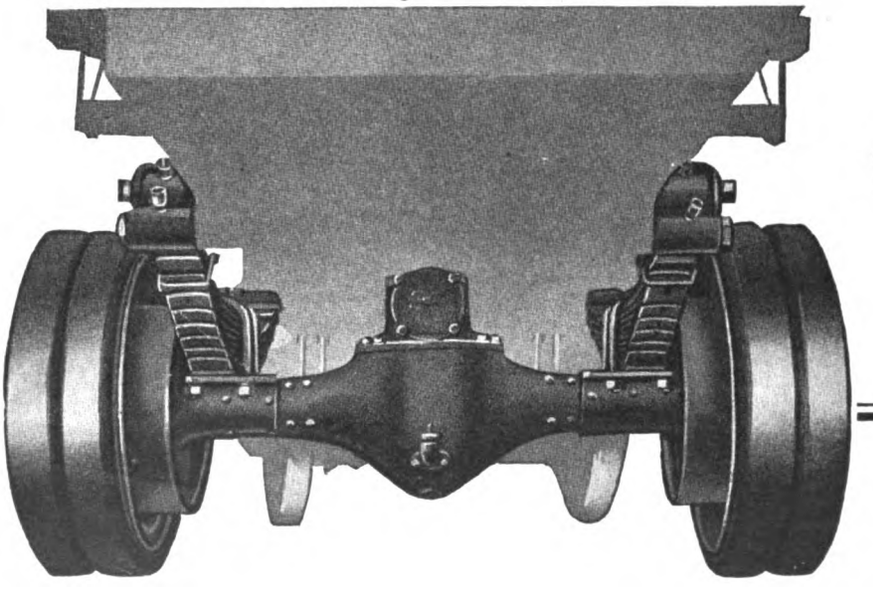
1. How steadily a truck runs.
2. How much it costs to keep it in condition to give continuous service, and
3. How little it depreciates in performing this service,

are what really determine the value of a truck? Purchase price, often the deciding factor in the choice of a truck, is not a reliable guide. Usually the cheapest truck to buy is the most expensive to maintain—the hardest to keep in operation—the quickest to depreciate.

SHELDON

SHELDON Axles and Springs are the highest priced on the market, hence SHELDON-equipped trucks generally bring a higher price than trucks equipped with other makes of Axles and Springs. But SHELDON-equipped trucks are CHEAPER IN THE END because the extra money represents **value**, and value in Motor Trucks means low upkeep, constant operation, and little depreciation.

Hadn't you better learn all about it? We'll be glad to send full particulars and give you a list of SHELDON-equipped trucks on request.



Sheldon Axle & Spring Company

Wilkes-Barre Penna.

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Kelly-Springfield
Tires for Commercial Vehicles



WINCHESTER BRICK COMPANY
10 TREMONT ST., ROOM 52
BOSTON, MASS.

PLANT AT
WINCHESTER, MASS.

October 18, 1916.

TELEPHONES:
OFFICE, FORT HILL 2256
PLANT WINCHESTER 220

Kelly Springfield Tire Co.,
698 Beacon St..
Boston, Mass.

Gentlemen:-

Under seperate cover you will receive a photograph of our 5 ton Pierce Arrow Truck. This truck is equipped with Kelly Springfield Tires. The picture will give you an idea as to the loads carried.

This truck has covered 14,000 miles in the past six months and during that time we have given your tires extremely hard service constantly. We have never found any reason to cause us to change our equipment as we are very favorably impressed with the service we have received. We appreciate the personal attention Mr. Pratt has has given us and the valuable sugestions he has offered.

We think we have the best truck equipped with the best tires obtainable.

Very truly yours,
Winchester Transfer Co.,
By C. K. Carmichael Mgr.

The responsibility of the Kelly-Springfield Tire Co. begins with the sale of a tire and never ceases until the user has received full satisfaction in every sense of the word.

General Sales Dept.
1900 Euclid Avenue, Cleveland, Ohio

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Sturdy and Sure



"We have had Garford Trucks ever since we acquired motor vehicles—and we will continue using them,"—says the H. C. Bohack Company of Brooklyn. Mr. Bohack has eight Garfords—three 5 ton, two 3 ton, one 2 ton and two 1 ton models.

Garford Motor Trucks.

FOR downright day after day dependability, for extraordinary fuel and oil economy, for the ability to perform the most gruelling labor, *steadily, smoothly* and *uncomplainingly* the Garford Motor Truck stands *away to the fore*—absolutely unapproached by anything else on wheels.

This ability to *do*,—this plugging, winning *persistence*,—this uncanny *economy*, has made the Garford name a world wide symbol of efficiency.

Garfords are successfully meeting hauling problems that few trucks would even attempt.

They are *making money* for owners in *all* parts of the world—under every conceivable condition of climate and highway.

And they are making money for dealers. We have room for a few more big calibre men in our selling organization. Address dept. 103 for complete information.

The Garford Motor Truck Company, Lima, Ohio

Manufacturers of Motor Trucks of 1, 1½, 2, 3½, 5 and 6 ton capacity
4½, 7 and 10 ton Tractors
Distributors and Service Stations in all Large Cities

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Haul It in a Hall

For Safety and Saving

There is nothing fine-drawn or delicate about the HALL TRUCK.

Here is a picture of one carrying four tons of steel. The rated capacity of this particular truck is three and a half tons, but just the same you can hop in, put your foot on the gas and drive this load away with absolute ease and safety.

And you can speed up, turn corners, plough through mud or sand, roll over rough roads—absolute ease and safety just the same!

That is the big point about the Hall—its in-built over-strength—its ability to rise to an occasion, to fill in an emergency, when time, money and business faith are at stake.

Big, burly, strong and speedy above all prospective needs, the Hall is an extraordinary time-saver, a cost-reducer, and the perfect embodiment of dependability.

In addition to its other merits the HALL is equipped with an IMPROVED WOOD HYDRAULIC HOIST, the fastest, most efficient and economical dumping device known, and a great cost cutter.

DEALERS: In addition to other sales helps and backing, we have arranged to finance your customers who desire to purchase on the deferred payment plan. Every HALL dealer is well taken care of and making friends and money fast. Better get in on this prosperity!

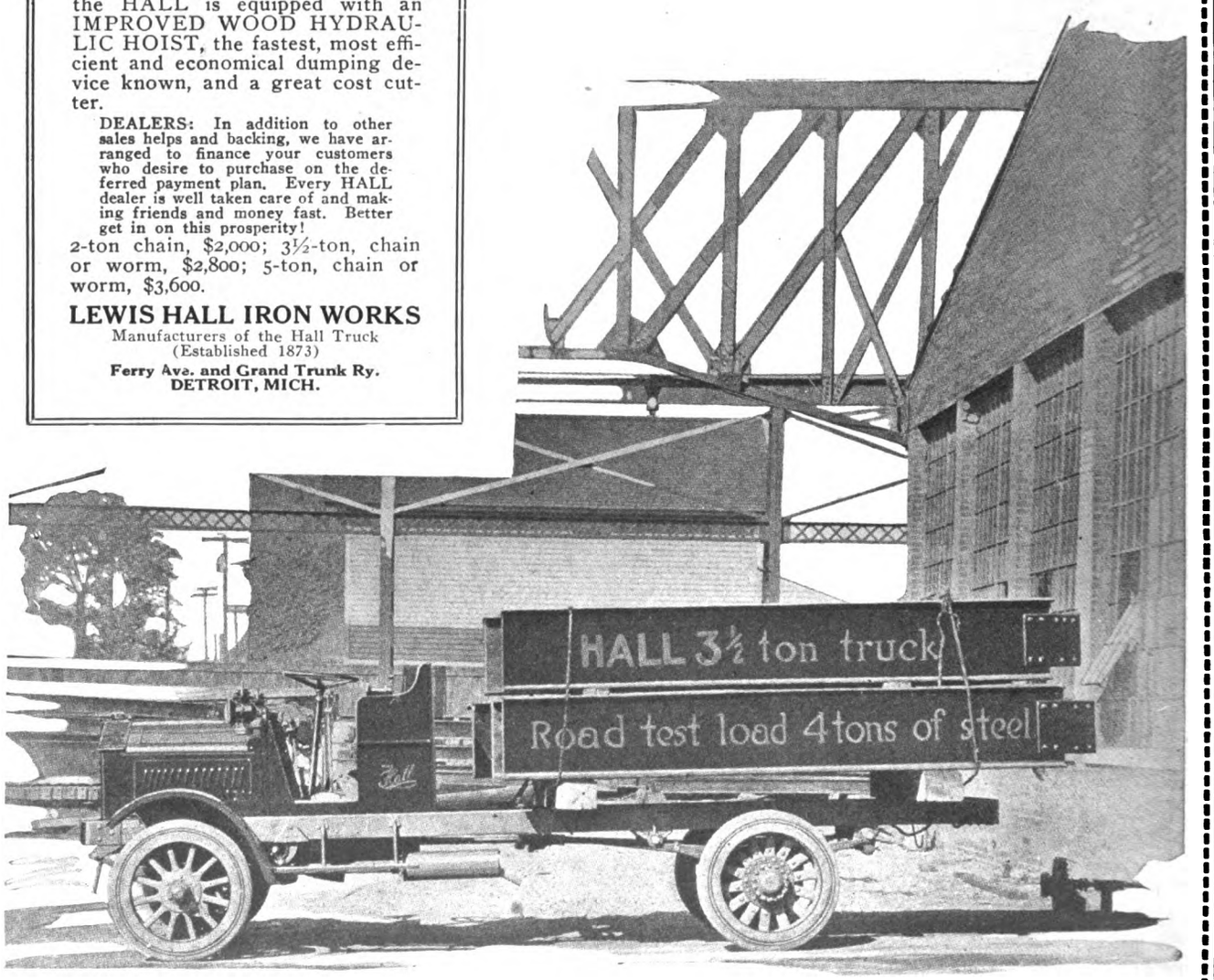
2-ton chain, $2,000; 3½-ton, chain or worm, $2,800; 5-ton, chain or worm, $3,600.

LEWIS HALL IRON WORKS

Manufacturers of the Hall Truck
(Established 1873)

Ferry Ave. and Grand Trunk Ry.
DETROIT, MICH.

THE Hall TRUCK



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No Delay with Easy-on Chains

"On or off in a moment"

Every truck should carry a set of Easy-on Chains to be prepared for emergency

Easy-on Truck Chains are single chains for solid tires, which fasten to the spokes. They can be put on in a moment, even when stuck in the mud. They consist of a very strong fastener for the spoke and a cross chain made of heavy, twisted links. The ends of the large chain which goes across the tire and the ends of the smaller leather covered chain which goes around the spoke, are slipped over the end of the fastener and locked in place with a small snap which can be fastened and unfastened in a moment.

Made in five sizes

Small size fits tires no larger than 3 in.	Price $.50 each, $4.00 per set of 8
Medium size fits tires from 3 in. to 5 in.	Price .75 each, 6.00 per set of 8
Large size fits tires 5 in. to 7 in.	Price 1.00 each, 8.00 per set of 8
Small dual chain fits dual tires smaller than 4 in.	Price 1.25 each, 10.00 per set of 8
Large dual chains fit dual tires larger than 4 in.	Price 1.50 each, 12.00 per set of 8

Packed a set of 8, 10 or 12 in a bag, as preferred.

If measurement around tire and rim is given when ordering, truck chains will be sent in exactly the right lengths. Easy-on Chains are also made for pneumatic tires. More convenient than ordinary chains. The pneumatic tire chains have specially designed fasteners and cross chains that do not mar the paint or chafe the rubber.

Made in Three Sizes

Size 3½ fits 3 in. or 3½ in. tires	$3.00 per set
Size 4½ fits 4 in. or 4½ in. tires	4.00 per set
Size 5½ fits 5 in. or 5½ in. tires	5.00 per set

Easy-on Chains will be sent prepaid on approval to any part of the United States or Canada on receipt of price. If you are not satisfied after examining, you may return them at our expense and we will refund the full amount paid.

Woodworth Manufacturing Corporation

Successors to Leather Tire Goods Co., Est. 1905

2005 Whirlpool Street

Niagara Falls, N. Y.

Canadian Factory:
Niagara Falls Ontario

New York Distributors:
Rose Auto Supply Co.
1765 Broadway

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① Strength ② Simplicity ③ Speed

STRENGTH without excessive weight
SIMPLICITY without cheap construction
SPEED without sacrificing Strength or Simplicity

BESSEMER TRUCKS

The requirements of truck users and the interests of truck dealers have been perfectly combined in

A Master Product

which serves each to their mutual advantage.

The Bessemer models represent the highest standard of truck construction.

In design, material and workmanship we have put years of experience and the result is a motor vehicle that under expert examination proves incomparably better than trucks with which it is tested.

We solicit inquiries from the trade and from those who already use trucks or contemplate using them.

One-Ton Internal Gear Shaft Drive $1095

Two-Ton Worm Drive $2200

Three-and-One-Half-Ton Worm Drive $3100

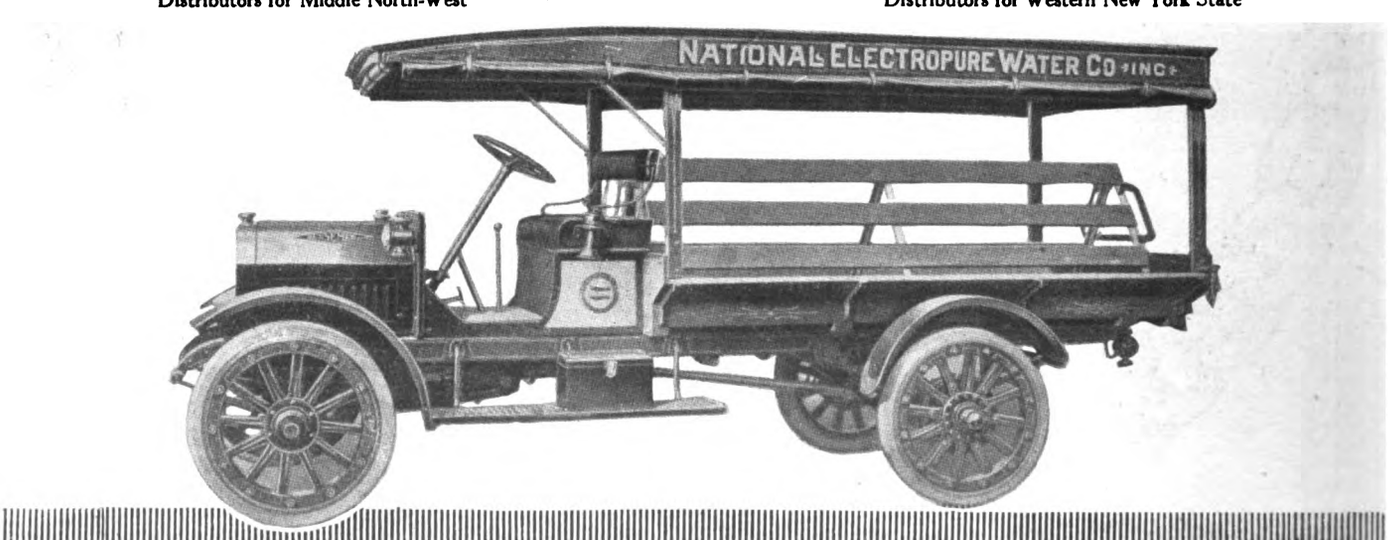
DEALERS—Write us NOW for our liberal selling plans. We give interested factory co-operation and enterprising aid to our dealers.

All Other Inquiries to

Bessemer Motor Truck Company **Grove City, Pa.**

Metropolitan Motor Co. Minneapolis, Minn.
Distributors for Middle North-West

The Bessemer Truck Co. Buffalo, N. Y.
Distributors for Western New York State



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CONTINENTAL MOTORS ★ Powerful as the Nation ★ AMERICA'S STANDARD

Selling Trucks Of Known Value

The confidence of the motoring public in the Continental Motor is a great factor in the sale of Continental-powered trucks. "A good motor is the sign of a good truck"—this is the opinion of experienced buyers.

Confidence is the basis of all sales. In the case of a Continental-powered truck, confidence is established between prospect and dealer at the very outset. Upon this foundation of recognized value, sales are readily made. The process becomes normal, even standardized.

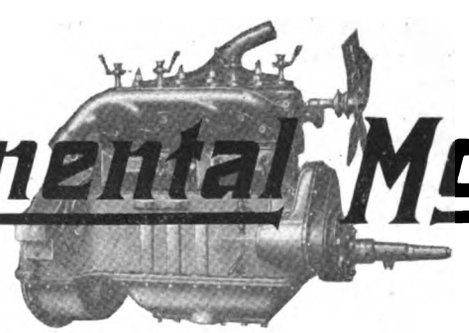
These facts explain why every year more and more Continental Motors are sold, and why alert dealers more and more appreciate the advantage of handling Continental-powered trucks.

CONTINENTAL MOTORS COMPANY

OFFICES: DETROIT, MICH.

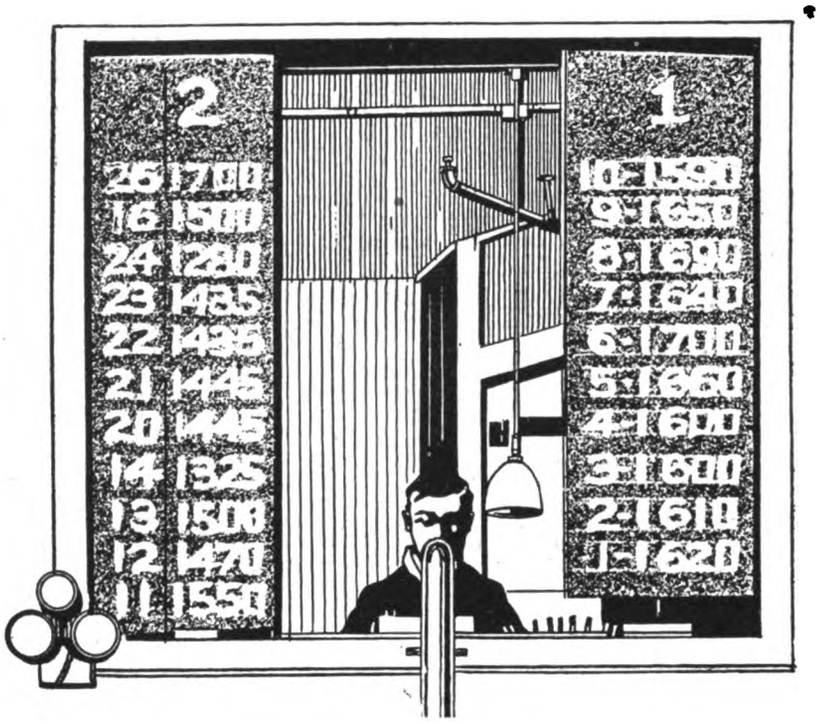
FACTORIES: DETROIT,—MUSKEGON

Largest exclusive motor manufacturers in the world



Continental Motors

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This Man—

has much to do in providing you with every insurance against trouble, failure and depreciation when you buy Brown-Lipe quality products.

As we have repeated frequently, your insurance against trouble, failure and depreciation is afforded by long experience and the most careful attention to manufacturing details.

BROWN-LIPE

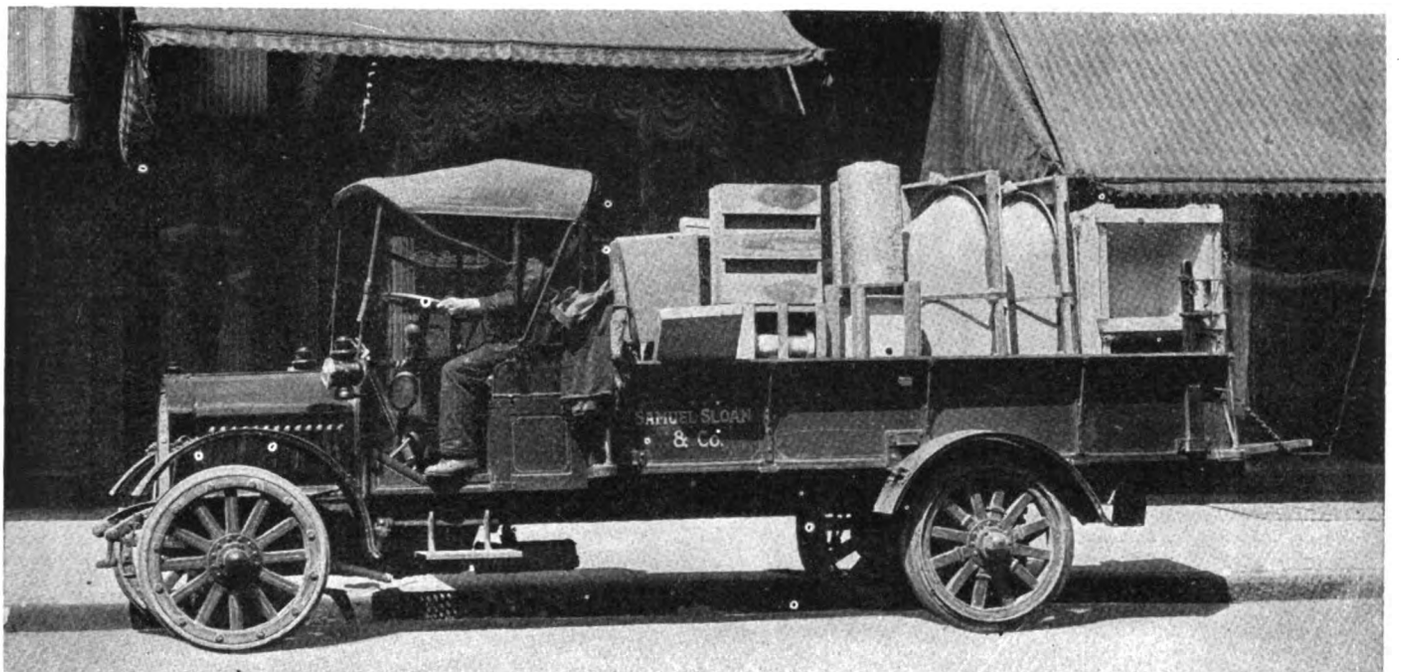
This man, constantly in touch with the heat treating department, emphasizes graphically "the most careful attention to manufacturing details." His duty is to check every heat treating furnace every five minutes to see that the heat is brought from low point to high point regularly and steadily. and that it is maintained at just exactly the right point, with but a few degrees of temperature variation during the specified time of the heat.

The closeness with which these operations are performed is perhaps one of the most important of the manufacturing details assuring Brown-Lipe quality.

BROWN-LIPE GEAR CO.
SYRACUSE TRANSMISSIONS NEW YORK
BROWN-LIPE CHAPIN CO.
DIFFERENTIALS

NEW YORK, Thos. J. Wetzel, 29 West 42d St.
SAN FRANCISCO, A. H. Coates, 444 Market St.
CHICAGO, K. Franklin Peterson, 122 S. Michigan Ave.
DETROIT, L. D. Bolton, 2215 Dime Savings Bank Bldg.
Foreign Agent, Benjamin Whittaker, 2, Norfolk Street, Strand, LONDON, W. C.

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Motor Trucks Are a Good Deal Like Men

When it comes to real hard labor, it's the big, brawny, hardened fellow who can stand the most of it.

The weaker, little fellow may keep pace with the big fellow for a while by overtaxing his physical force—but eventually he peters out.

It is exactly the same with motor trucks.

The low-priced, poorly constructed truck may give excellent service for a while—but in short time, it breaks down or wears out. It can't keep pace with a quality truck.

SELDEN TRUCKS

SELDEN TRUCKS · SELDEN · IN-BUILT QUALITY

are the big men—the sturdy, dependable fellows—ever ready to put their shoulders to the wheel, to haul the load without flinching a muscle.

They are "IN-BUILT QUALITY" trucks—made from the best materials obtainable—built RIGHT by men who know how to build longevity into a motor truck.

That's why they are on the job every working day of the year—economizing for their owners—making satisfied customers for Selden Dealers.

DEALERS! Write for our Liberal Proposition at once

Selden Truck Sales Co.

Rochester, N. Y., U. S. A.

Digitized by Google

Your Neighborhood Business can be made city-wide with

Tonford

TRADE MARK

If a one-ton truck will do, a "Tonford" will do better.

—*Trade Slogan*

$325

F.O.B. DETROIT

MADE IN DETROIT USA

The "Tonford" truck unit, simply and quickly attached to **any** Ford chassis, old or new, gives you a one-ton capacity truck of proven reliability.

It will cut down delivery costs and increase your business.

Inadequate delivery service restricts your trade field. A "Tonford" will make the whole city your "neighbors." You can deliver anywhere quickly and carry a load far beyond the capacity of any truck or delivery car.

Cuts Delivery Cost

It is reducing delivery costs for merchants in every line of business—it will reduce them for you. Make us prove it.

The "Tonford" has Ford strength, Ford economy of operation and upkeep and Ford simplicity.

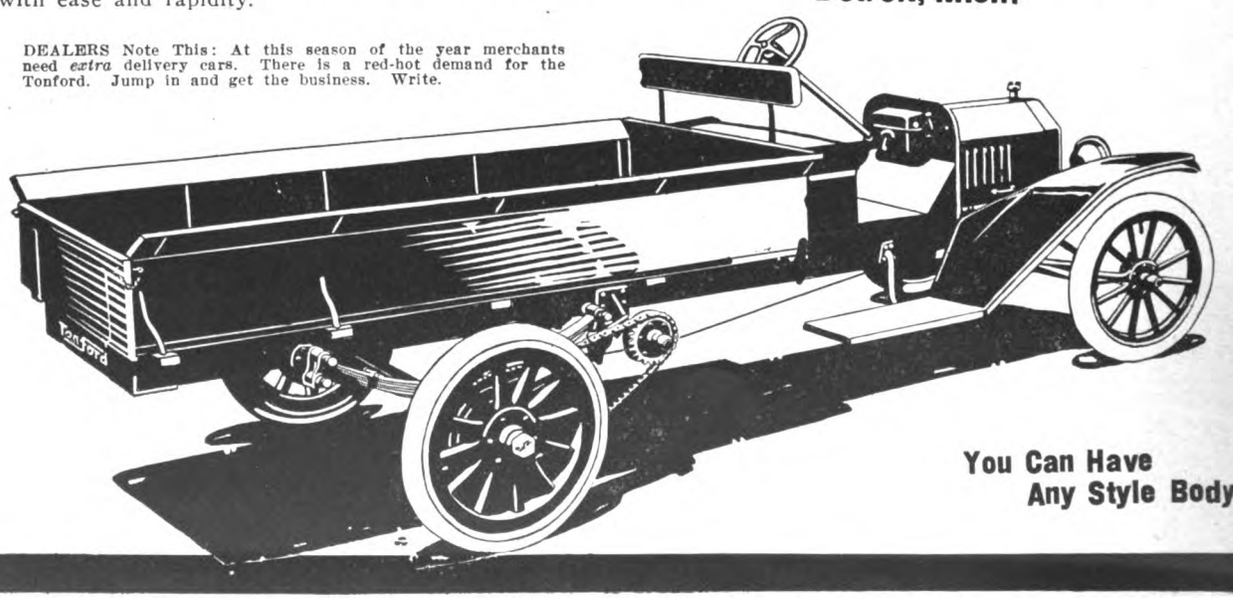
It handles easily—and carries the load up any hill with ease and rapidity.

Should you desire at any time to turn the car back to a pleasure vehicle, the "Tonford" truck unit can easily be detached.

Compare the "Tonford" with the best one-ton trucks in efficiency and economy, and then think of the Tonford price. We will risk your decision, for we know what the "Tonford" is, and what it will do. Write at once for name of nearest "Tonford" dealer.

DETROIT TRUCK CO.
Detroit, Mich.

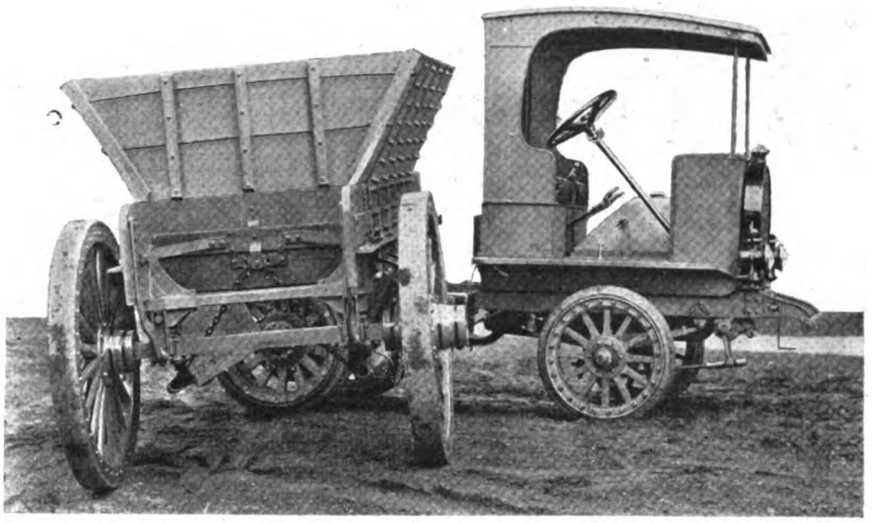
DEALERS Note This: At this season of the year merchants need *extra* delivery cars. There is a red-hot demand for the Tonford. Jump in and get the business. Write.



You Can Have Any Style Body

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Study These Big, Exclusive Watson Tractortruck Features



YOU will not find them on conventional trucks. These are Watson advantages, devised by Watson engineers, and found only on the

100% WATSON Tractortruck

Pictures below tell the story of Watson predominance, of the ability of the Watson Tractortruck to handle with ease and dispatch and at lowest upkeep cost every conceivable heavy duty hauling job.

Watson Features:

Turns in its own length without backing.
Undercut bottom dump.
Gravity—not power—does the Dumping.
60% of load carried on steel tire.
Sub-frame carries weight of power-plant, tank and seat when truck is empty.
Utmost flexibility; various types of trailers can be used with same tractor.
Minimum gasoline consumption.
Lowest upkeep cost.
Greatest Tire Service.

Watson Dump Wagons too, are recognized leaders. They are in daily use wherever greatest strength, convenience, and stamina are foremost.

Watson Tractortrucks, Trailers, and Wagons are constructed entirely in the Watson Company's own plant—the largest Dump Wagon factory in the world—and are the outcome of many years constant application to the development of the highest grade, most advanced heavy hauling equipment.

Illustrated Catalogs and special literature sent anywhere on request.

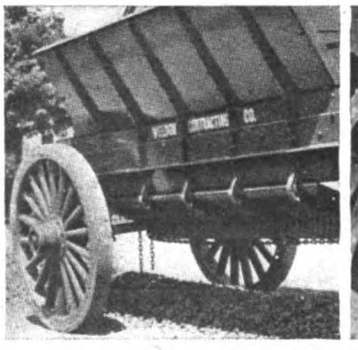
DEALERS—To couple up with the Watson Selling Plan is to secure quick returns and a permanent, ever expanding business. A wire will bring specific details.

WATSON WAGON COMPANY
40 W. Centre Street **Canastota, N. Y.**

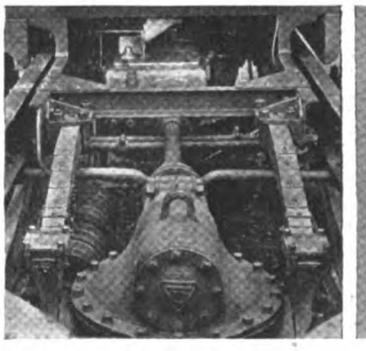
Tire Saving—*60% of load carried on steel tires*



Labor Saving—*Famous Bottom Dump — unloaded by gravity*



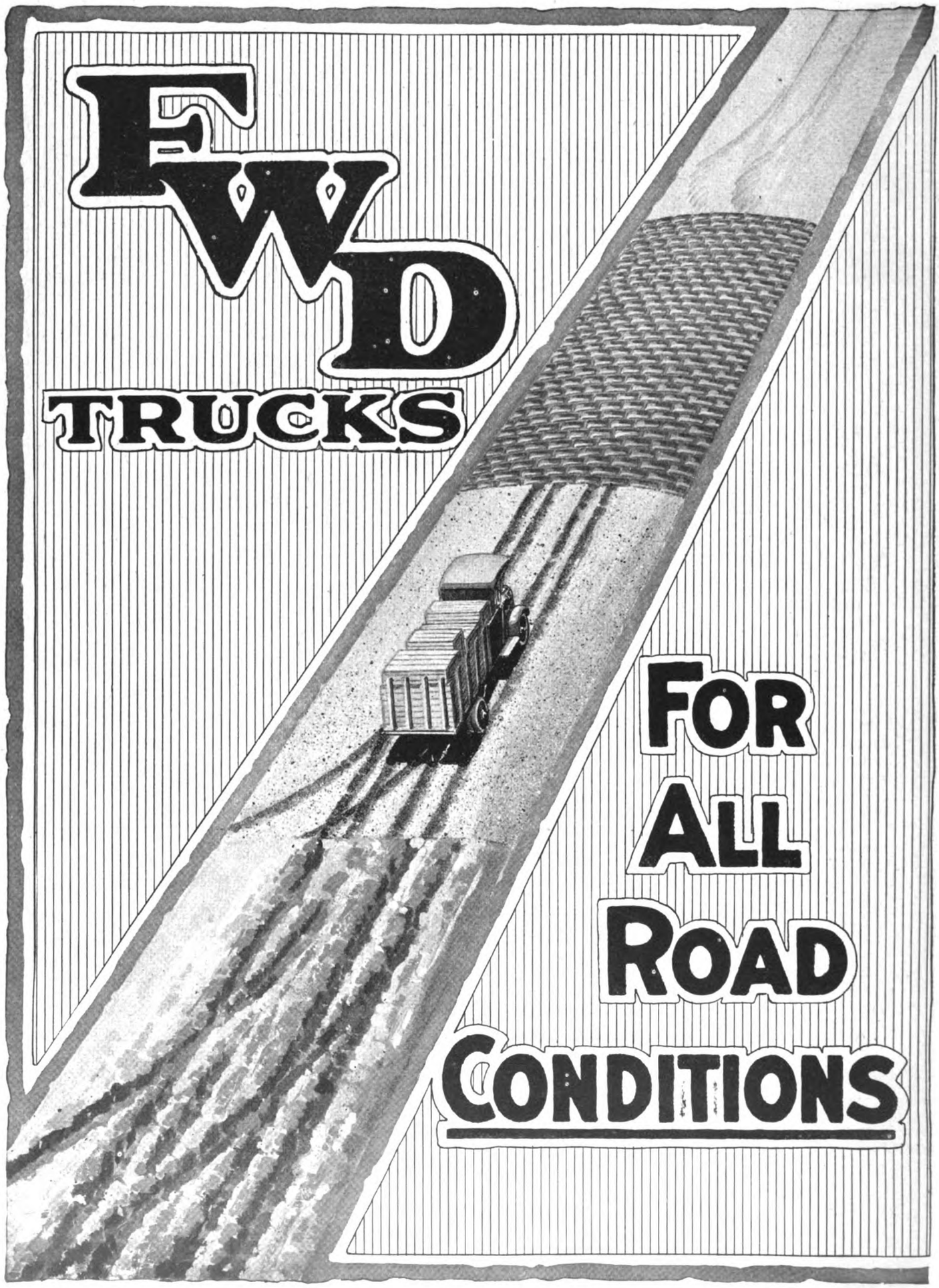
Wear Saving—*Sub-frame protects vital parts when* running empty



Time Saving—*Shortest turning radius* without backing



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PLEASE MENTION THE COMMERCIAL VEHICLE WHEN WRITING TO ADVERTISERS

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DEPENDABILITY is a word so full of meaning that it sums up all that is required in a truck. To tell how this word applies to F-W-D Trucks requires the 28 pages of the new catalog. This book explains clearly how the four wheel drive principle as applied to the

FWD TRUCK

Means

Dependability Under All Conditions

On Smooth City Streets the F-W-D Truck with equally distributed weight, power and strains, delivers a maximum of useful power with a minimum of wear and tear on mechanism, frame and tires. The power being in all four wheels and the brakes acting equally on all four wheels, skidding is practically eliminated.

On Block Pavement and Cobblestones the vibration is equalized, thus removing the tendency to rack and twist the frame, shafts, motor and transmission.

The body is designed so that 55 per cent of the load falls on the rear axle, instead of 75 to 90 per cent as in rear drive trucks.

Power in the front wheels helps to reduce the vibration as they lift themselves over the bumps, instead of being pushed over by the rear wheels.

In Sandy, Muddy or Rutty Roads F-W-D Trucks on account of having traction in all four wheels, are able to go through difficulties that would be impossible for rear drive trucks.

In short, the four wheel drive principle as applied in F-W-D Trucks makes for dependability in every condition, road, load or traffic. Every point is clearly demonstrable and every demonstration brings out the fact that the adoption of the F-W-D Truck will be a lasting, good investment—one that pays dividends in economy, durability and continuous service.

Dealers who desire to build up a truck business on the sound basis of continued satisfaction to their customers are acceptable in unoccupied territories. To such we will gladly send details of our dealers' arrangement with prices, discount and terms.

Write for the New Illustrated Catalog.

FOUR WHEEL DRIVE AUTO COMPANY

Dept. K. **Clintonville, Wisconsin**

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Quality Construction plus Quality Performance equals "*On the Job*"

The claim of the Signal Motor Truck for your business is not based upon any sensational exploit or any sensational feature. It is based upon two things only: (a) quality construction all through, (b) quality performance in daily service.

The quality construction is evidenced by the use of exclusively quality units, such as Continental Motors, Timken-David Brown Worm Drive Rear Axles, Ross Steering Gear, Brown-Lipe Transmission, Eisemann Magneto, Detroit Self-Lubricating Springs, Stromberg Carburetor.

Equally important with the quality of the units is the careful engineering and the practical skill with which the various units are harmonized into one complete unit of remarkable strength, endurance and reliability, so that the uniform experience of users everywhere is quality performance in daily service—and the uniform report to those who inquire of users concerning Signal Motor Trucks may be boiled down into five words: "They are on the job."

No matter what business you are in, no matter for what service you require a motor truck, the most important element you can buy in a truck is the ability to be "on the job."

Signal Motor Trucks are built in all sizes, from 1 ton to 5 tons. Write for catalogue and full information concerning the Signal line.

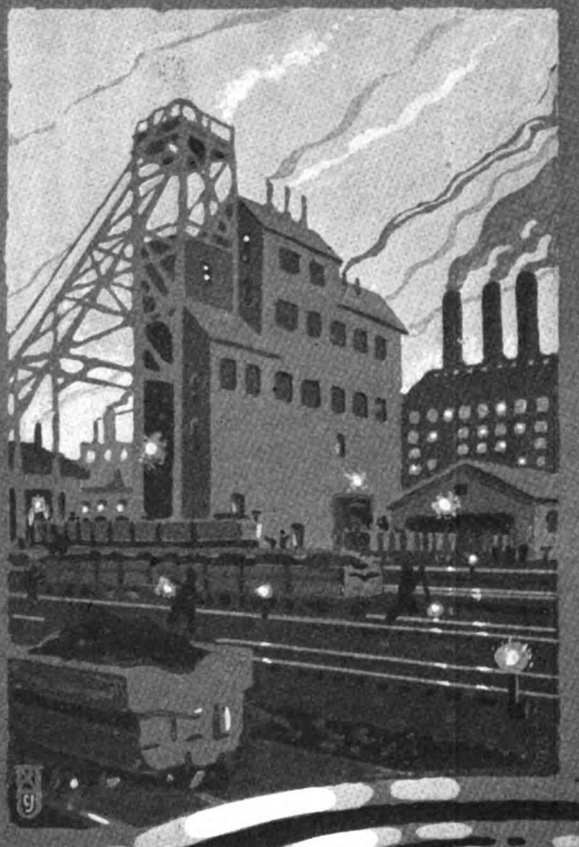
Signal Motor Truck Co.

Detroit, Mich.



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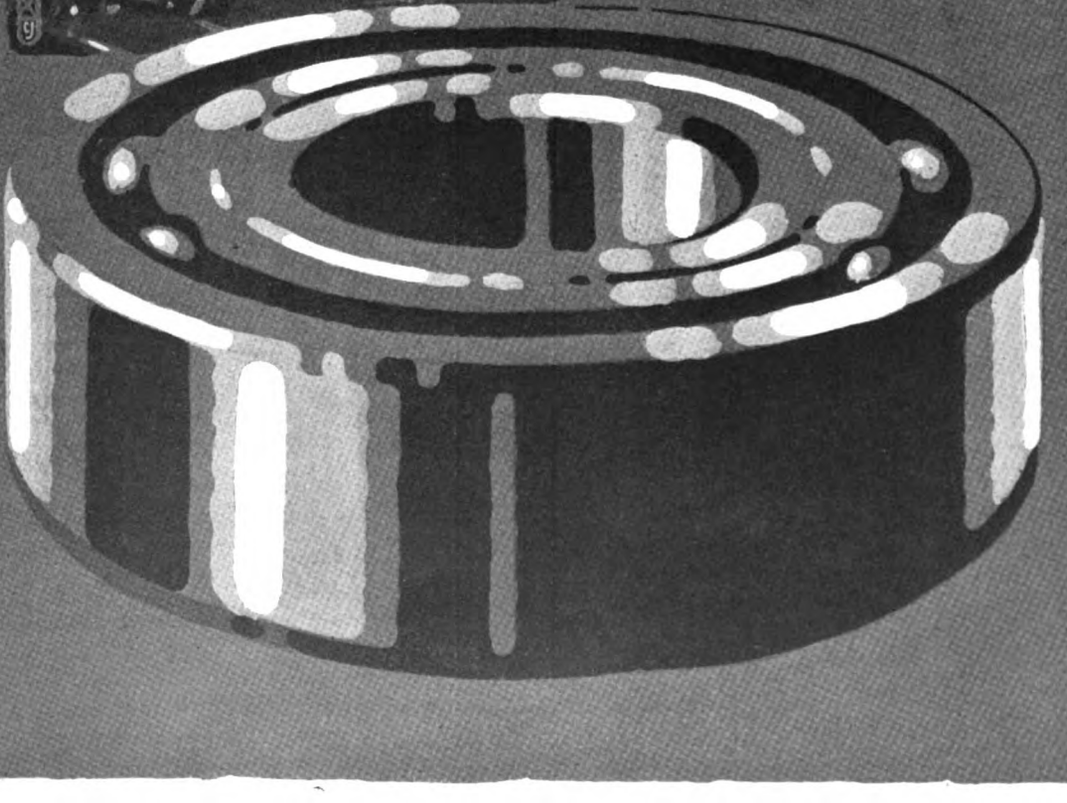
GURNEY



With the demand for coal greater than it has been in years, with the price of coal higher than it has ever been, the strain thrown upon your productive resources is terrific. Every instrument of production should be maintained at top-notch efficiency.

Gurney Ball Bearings on the armature shafts of your mine locomotives will help tremendously in seeing that the locomotives do—and keep doing!—their share

GURNEY BALL BEARING COMPANY
Conrad Patent Licensee
JAMESTOWN, NEW YORK
Chicago, Ill. New York City



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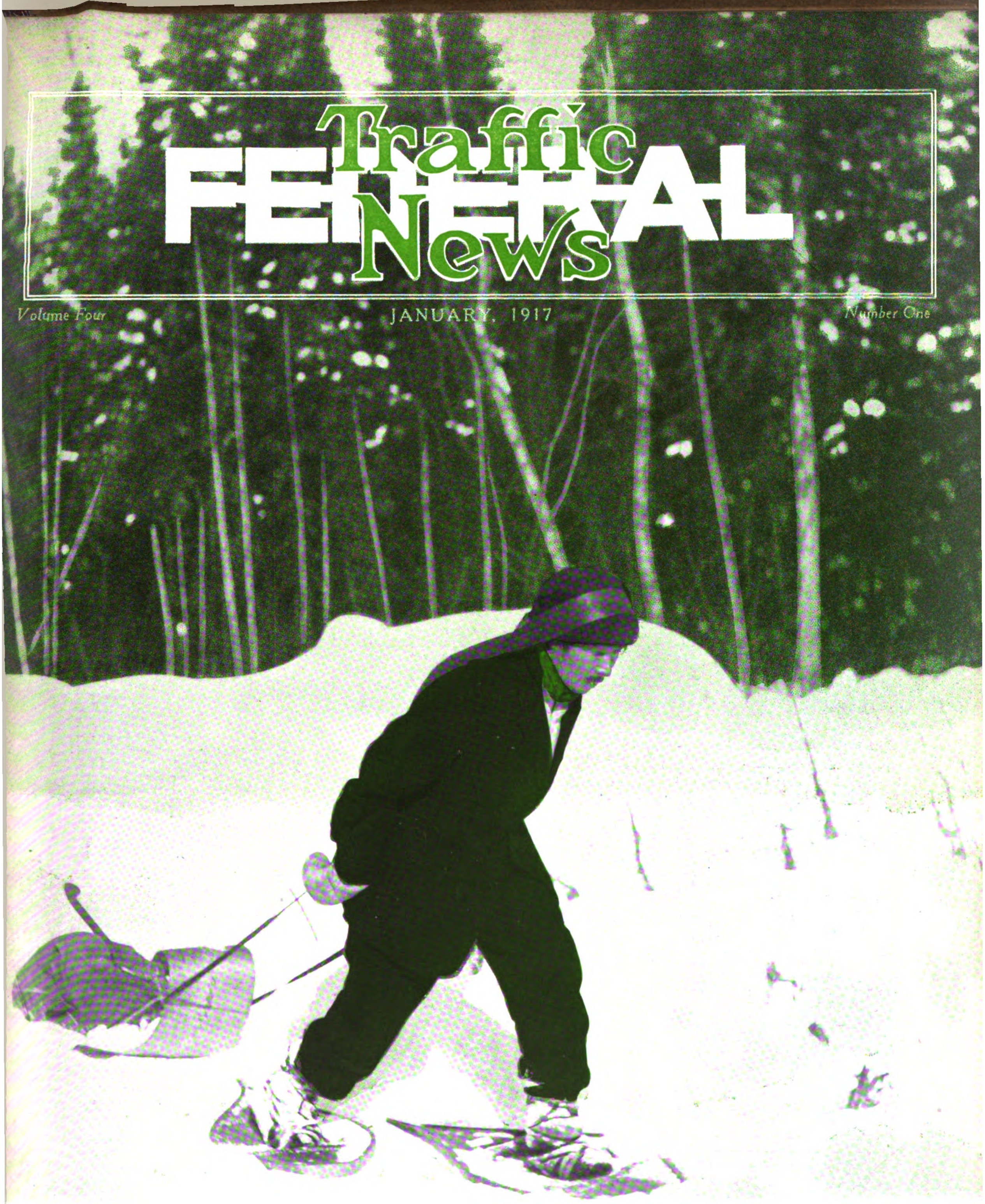


PLEASE MENTION THE COMMERCIAL VEHICLE WHEN WRITING TO ADVERTISERS

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Traffic NEWS

Volume Four JANUARY, 1917 Number One



January's Haulage Problem in the Northwest

This Edition 28,000

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The Oldest Method of Hauling

The old adage—"If you want a thing done well do it yourself," must have originated away back before man had any knowledge of harnessing either beast or machine to his own labor.

The picture on the front cover represents one of the two methods of hauling which has been common for hundreds of years in the latitudes north of the wheat belt.

Up until very recently Alaska and northern Canada did not have even railroads for transportation. Railroads are being put thru rapidly in these northern territories and it will not be long before the motor truck will be a factor in the transporting of supplies to the land of husky dog and reindeer.

The Indian shown in the picture on the front cover is taking his winter supply of meat on the small hand toboggan to his little cabin up in the woods. This food has to be transported about 150 miles from the nearest river town and he has only himself to depend upon to get it home. This is one place where Traffic Engineers have not been called upon to figure out the haulage cost.

How I Won Out Under Difficulties

Autobiography of FEDERAL No. 5672
Owned by a Cleveland Contractor

I CAME into the world a short time ago and as it is the custom for all of us to be sent away from home early to earn our own living in the world I soon found myself leaving the place of my birth. They tied a tag on me for I was too young to travel alone. I was put on a large flat car and it carried me all the way to Chicago.



One of my first jobs was in a deep excavation

I had a very easy time in Chicago for there did not seem very much for me to do. I could see enough that needed doing but the men who had the work to do seemed to want to use horses as their fathers did years ago. I knew I could do the work cheaper and better but no opportunity came.

After I had been at Chicago a few days, word came from Cleveland, Ohio that a contractor by the name of Joe Mercurio was looking for a truck like me and so I was sent down to him. I was glad to go for I was tired of being idle when I knew I could help the h. c. of l. if I was only given a chance to work. And, too, I was getting stiff from lack of exercise.

It pleased me when a tag was tied on me which would let me go to Cleveland. The man who was to be my owner was waiting for me and seemed very proud because he had heard such good things about me. We soon became acquainted and I found him a very good friend. He took good care of me and when he drove me around always treated me as a truck with a good pedigree should be treated.



A large steam shovel dropped the dirt onto our backs

One of the first jobs he asked me to help him do was drawing dirt from a large excavation and I must tell you about it. The excavation was being made in the northeast corner of the square where Ontario and Factory Streets join. A large steam shovel was used to dig out this excavation and load we trucks. We carry our load in a steel body on our backs. I am the biggest one in my family but we are not the largest in the country. There are many larger giants then we, and some of these big fellows were there working on the job with me. I have found by experience that I can carry 3½ tons easily over any ordinary road. Some of these helping me said they carry five ton as easily as I could 3½. They even went so far as to try and make me ashamed of my work.

This is one of my big friends taking the alternative of the long less difficult route up



I kept doing my best, however, and the other day had a chance to get even. It was a big climb up the steep hill from the excavation as you can see by the pictures and the worst of all was the hairpin turn just at the foot of this hill which prevented us getting any start. There was an easier way to get out but it meant a long trip which we wanted to avoid.

My friends were loaded up and tried the steep hill. It was very hard going and they had to stop four times in going up to get their breath, so I began to wonder how I would get along. I almost trembled in my boots but knowing that my wind and my heart had always been good, I decided not to cross any bridges before I came to them. So I run into position and received my load.



It was so easy for me in spite of the hairpin curve I was ashamed of the others

I remembered the good reputation that my family had established for themselves and not wanting them to lose any of it on my account, I started up the hill. It was easier than I thought and before I knew it I was at the top and on my way to the dump. I was soon back for another load and before I had been working on the job a great while was getting so I liked to make the hill.

I suppose one reason I liked the hill was because all my bigger friends did not like it, in fact they grew to dislike it very much and would not try to go up it. My owner was very proud of the work I did and the ease with which I did it and when we returned for one of our loads he suggested that I try and carry a big load like the others. I hesitated at first and then I said I was willing to try.

So they gave me a load of five tons to carry. I braced myself carefully as I started up the hill and much to my surprise and that of my owner and all the people who were watching I reached the top of the hill without having to even stop and get my breath.

I can't imagine that I could carry many such loads as that was. My owner is very kind and I think he will not ask me to do it very often.



This is one of my co-workers who tried and failed to follow me up—He hurt himself trying it

This FEDERAL Owner Advertises with Soap and Water

THERE are many unique ways of keeping your name before the public, but A. W. Smith, of Leroy, N. Y., is perhaps the originator of a different kind of publicity.



There was no place left to load the goods

Mr. Smith operates a one and one-half ton FEDERAL in the general carting business, and because of the fact that Mr. Smith keeps this FEDERAL clean and well polished, he is always ready for any emergency.

That this method of advertising, by keeping his truck well washed, polished and shiny is a paying investment is shown by the two pictures herewith, which are chosen from a number which Mr. Smith has sent us. One is of the float or parade containing about 40 small maidens. The other is a load of household goods in which the goods are not only loaded in every available spot in the body but are piled high on top of same. This load weighed over five thousand pounds.

We are always glad to show FEDERAL Motor Trucks in action. If you will send us pictures of your truck we will be glad to publish same in TRAFFIC NEWS especially if there is a good story to go with it.



This FEDERAL is always ready for a parade

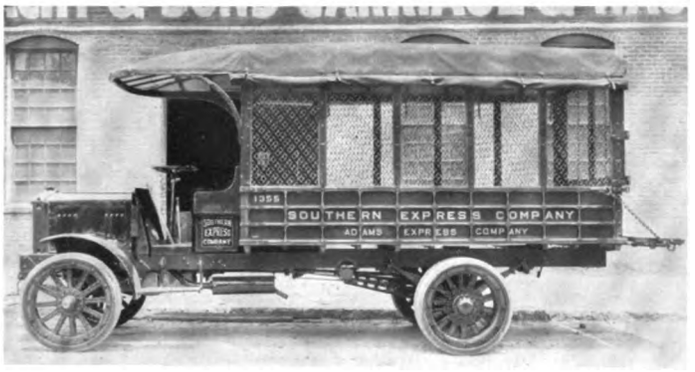
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The Ton-Mile Basis for Cost Figures

The ton-mile, the package-mile, the M-foot mile—What they are and how shall we figure them

COST figures, when properly compiled furnish one of the only reliable bases from which to improve any service. Particularly is this true of transportation systems and delivery service. These figures must also be brought to the same level to be of any service for comparison.

This last statement, in itself, must be carefully considered, for it is common practice to make all sorts of comparisons disregarding all the conditions surrounding the things to be compared. The ton-mile and its different varied forms of which the package-mile, the M-foot mile and the delivery-mile are but the more important, is but the result of getting a common basis for making comparisons.



The package delivery cost on this truck can be better than the average — it carries at least a partial load in both directions.

But again, it should be known and appreciated that when the ton-mile basis is attained it may be effected to a great extent by other conditions. To illustrate: If the conditions surrounding a delivery employing two trucks of the same capacity are identical except in the number of miles which each travels, the ton-mile cost will not be the same. A table taken from standard cost figures will prove this.

Miles per day	15	20	25	30	35	40	45	50	55	60
Cost per mile	$.307	$.248	$.213	$.189	$.173	$.16	$.15	$.142	$.136	$.131
Cost, ton-mile	$.204	$.165	$.142	$.126	$.115	$.106	$.10	$.094	$.09	$.087

From this table we can see that increasing the daily mileage in this case from 15 to 60 miles has reduced our ton-mile cost 234 per cent. Of course there is a reason for this.

The Reason

Truck costs as generally figured are of two kinds: Fixed—those which must be paid every day even if the truck stands idle all day; and Variable—those which depend on the work which the truck performs. The cost of any work performed by the trucks consists of the fixed and variable charges for that time required to do the work. The fixed charge is the same regardless of mileage so the fixed charge per mile will depend on the number of miles.

Suppose our fixed charge is $4.00 per day. Now, if our daily mileage is 20, our charge per mile will be $.20, but if our mileage is 40 our charge per mile will be only $.10. Let us assume our variable charge to be $.07 per mile. Then in the two cases above we have a mileage charge of $.27 and $.17 respectively.

Relation of Miles and Ton-Miles

Through some misunderstanding ton-miles are figured in almost as many ways as there are companies figuring and it is our purpose to show the basis on which ton-miles must be figured to be correct. Defined, a ton-mile is the carrying of one ton, one mile. A five-ton truck loaded to capacity will accomplish 5 ton-miles in going one mile. Ton-miles then depend on the miles travelled and the load carried. It is very essential to get the proper relation of these two items if we want a proper unit cost.

Some users have multiplied the miles travelled per day by the total weight in tons carried that day. This might be right if the truck made but one trip, but if more trips were made this result should be divided by the number of trips. Even this result represents the ideal condition and not an average one. There are at least three hauling conditions: Carrying a capacity load the entire length of a round trip.

Carrying a capacity load to a given point and returning empty.

Carrying a capacity load out and returning with a partial load.

Starting with a capacity load and distributing it over the entire round trip may be considered in the second group.

Each of these conditions should be figured differently and we believe the following methods correct. The first we will call "full load" basis, the second "half load" basis, and third, "three-quarter or fractional" basis.

Figuring on the Basis

In figuring on the "full load" basis, every mile of travel is represented by an actual load and so the cost can be equally distributed over the entire mileage. On the "half load" basis only the mileage is represented by a load, and so the loaded miles must pay for the empty miles. Also on the "three-quarter or fractional" basis only a part of the entire miles travelled are represented by a capacity load and these empty miles must be paid for by the loaded miles.

A formula for figuring these conditions can be expressed in either of two ways. By trips we mean round trips.

FULL LOAD BASIS

(1) Miles per trip X Total { tons packages per day / deliveries } = { tons packages / deliveries } Miles

or

(2) Miles per day X Average { tons packages per day / deliveries } = { tons packages / deliveries } Miles

HALF LOAD BASIS

$\frac{\text{Miles per trip}}{2}$ X Total { tons packages per day / deliveries } = { tons packages / deliveries } Miles

or

$\frac{\text{Miles per day}}{2}$ X Average { tons packages per trip / deliveries } = { tons packages / deliveries } Miles

FRACTIONAL LOAD BASIS

$\frac{\text{Miles per trip}}{\text{Total Miles} \div \text{Loaded Miles}}$ X Total { tons packages per day / deliveries } = { tons packages / deliveries } Miles

or

$\frac{\text{Miles per day}}{\text{Total Miles} \div \text{Loaded Miles}}$ X Average { tons packages per trip / deliveries } = { tons packages / deliveries } Miles

A single example will prove that either formula will produce the same result.

A 1½-ton truck makes 4 trips a day; travels 60 miles and carries a capacity load both ways. How many ton-miles are represented.

The round trip distance equals 15 miles. Then by formula number 1

15 (miles) x (4 x 1.5 tons) = 90 ton-miles

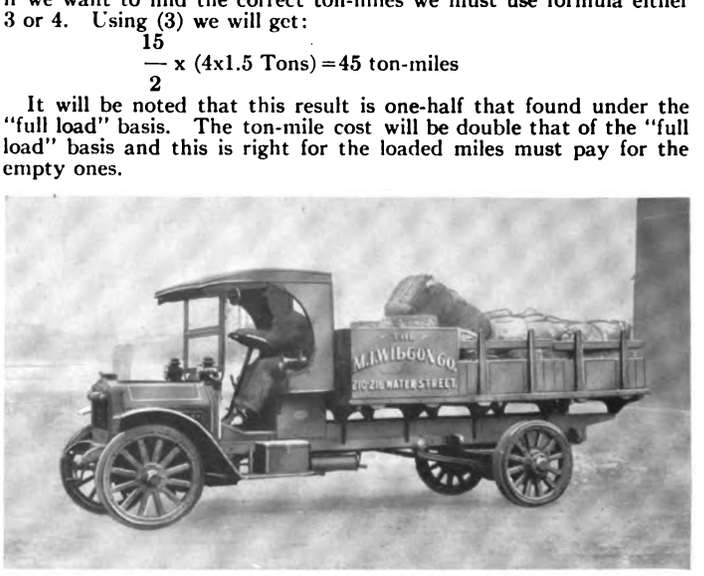
and by formula number 2

60 (miles) x (1. 5 tons) = 90 ton-miles

Let us suppose that this truck only carried a load one way. Now if we want to find the correct ton-miles we must use formula either 3 or 4. Using (3) we will get:

$\frac{15}{2}$ x (4x1.5 Tons) = 45 ton-miles

It will be noted that this result is one-half that found under the "full load" basis. The ton-mile cost will be double that of the "full load" basis and this is right for the loaded miles must pay for the empty ones.



The delivery cost on this truck is necessarily high—it never has a load except in one direction.

Again let us suppose that this same truck went out with a full load and returned with a half load. The correct ton-mileage can be found

Continued on page six, column one

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The Big Idea Back of the FEDERAL

"For six years past the FEDERAL has made an average annual sales increase of 126 per cent.

"There have been more FEDERALS sold in the United States than any other truck of like capacities.

"The FEDERAL dealer organization is larger, and its personnel changes less, than any other truck organization in the country.

"The FEDERAL has grown out of its own success —never been reorganized, refinanced, or failed to make a profit for the factory, dealer, and user."

From a Speech to Federal Motor Truck Dealers by Martin L. Pulcher, Vice-President and General Manager, Federal Motor Truck Company.

The FEDERAL is a Co-Operative Organization

THE FEDERAL idea is to build the service into the truck rather than pay a high price for expert doctors to keep it on the road afterwards.

Every part of the FEDERAL truck has to run the gauntlet of the day-by-day experience of FEDERAL Dealers.

These Dealers make money selling trucks; they have to sell trucks and **keep them sold.**

The pleasure car is sold to the man who **wants** a car, and he takes his troubles as a part of the game.

The FEDERAL owner buys a truck to decrease his troubles and expense.

FEDERAL Dealers make good on **both** trouble and expense.

The Shadow of the FEDERAL

An "institution is the lengthened shadow of a man." The big institution is the shadow of big men working as one, so the FEDERAL looms large over the truck market.

FEDERAL Traffic Engineers have records of FEDERALS meeting all kinds of transportation problems for all kinds of business. There is real experience data on good and bad roads—hills and flat country—big and little loads, and overloads for everywhere the FEDERAL is doing its stunts without fuss or fumbling.

No wonder 62% of the yearly sales are made to old users.

No wonder a FEDERAL agency is a dealer asset, worth money at the bank.

No wonder FEDERAL dealers are a conscious part of an enthusiastic organization.

The FEDERAL Success Doesn't Happen

Singer always means sewing machine—**Victrola** means phonograph—**Burroughs** means adding machine—**Kodak** means camera—**N. C. R.** means National Cash Register —and each means the best in their lines, so **FEDERAL** has come to mean the best gas truck in America.

It has been placed there by right policies, right methods in the hands of picked men.

It is the reason behind the keynote of FEDERAL policies—"the Best is Insurance."

A truck is bought to do one thing—increase the efficiency of transportation. The haulage problem differs in the flat, broad streets of Chicago from the narrow, hilly streets of Baltimore. It differs between the short hauls of Oklahoma City and the long suburban hauls of Philadelphia and Boston.

As every city has its peculiar problems—so has every line of business, the florist and the grocer, the coal man and the department store, and the rest.

The FEDERAL dealer contributes his local experiences to a common fund—the Company's special field investigators are constantly making new facts available—and users are daily making new tests and our Traffic Engineers are compiling and analyzing these for your benefit—for the common good of FEDERAL users, present and to come.

Cutting the Cost-Per-Ton-Mile

The FEDERAL is sold on its ability to deliver a low cost-per-ton-mile just as James J. Hill set a cost-per-ton-mile standard for railroads that revolutionized American freight traffic and charges.

The FEDERAL organization is with scientific patience whittling down this cost because that will enlarge the file for FEDERALS.

The FEDERAL has developed its standards on the experience figures of thousands of users.

These standards have been classified for department stores, breweries, wholesalers, manufacturers, and hundreds of others—by long and short hauls—by non-stop and short-stop—all day and short day—twenty-four hour and half-hour—country and city—special territories.

The FEDERAL dealer comes to the customer not merely as a salesman, but as an expert in his delivery and haulage problems, localized, personalized.

No FEDERAL dealer wants to sell a truck so badly that a customer need take a truck that does not fit his needs.

A FEDERAL User Must Be Made a Booster

That is a result of all the tests—and a reason for the success of the FEDERAL, truck, company, dealer, and user. Not one of these has a truck interest that is not common to all.

Because every FEDERAL man from designer to salesman has the instance in mind the FEDERAL is the easiest-to-sell truck, and the best-sold truck of its class in America.

So the dealers and users say.

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FEDERAL Trucks Are Making Good In the Contracting Business





Economy is a Big Factor in FEDERAL Handling of Materials



This FEDERAL Hauls Over 3,000,000 Pounds per Month in Virginia at a Cost per Ton of But 15 Cents—A Good Record

Addenbrook's FEDERALS in the general cement work at Norfolk, Virginia, are daily proving the value of Federalized transportation. Over three million pounds of cement ingredients were delivered during August and although this material had to be delivered nearly two and one-half miles the cost for delivering a ton was but 15c.



The Big Dump-Job FEDERAL is Quickly Loaded and Unloaded.

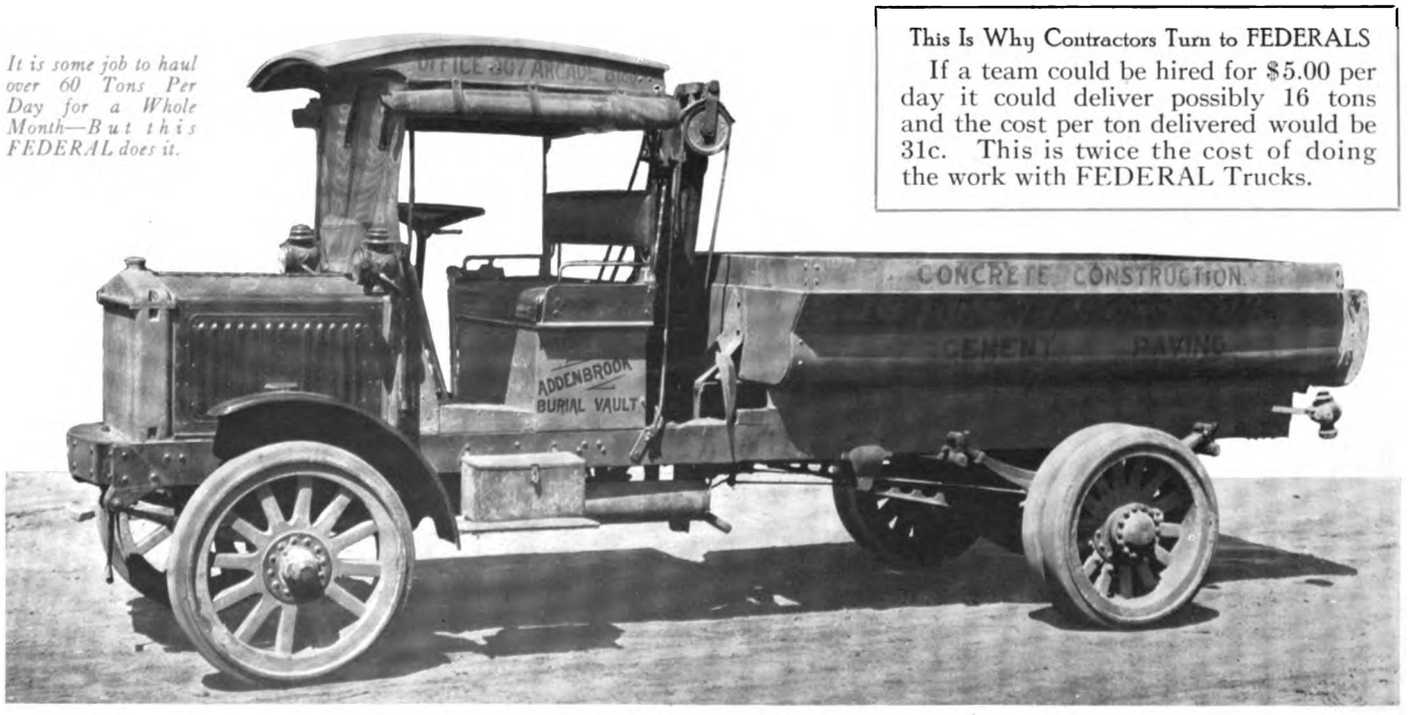
One Month's Record of Addenbrook 3½-Ton FEDERAL

Days in service	25
Number of trips	407
Weight in pounds carried	3,048,750
Miles travelled	975
Tons delivered per day	60.9
Miles travelled per day	39
Round trip distance	2.4
Miles per gallon of gas	4.3
Cost per day	$9.50
Cost per mile	.24
Cost per ton	.15
Cost per ton-mile	.13



Man and Animals on the Job Must Stop to Eat and Rest—The FEDERAL Doesn't

It is some job to haul over 60 Tons Per Day for a Whole Month—But this FEDERAL does it.



This Is Why Contractors Turn to FEDERALS

If a team could be hired for $5.00 per day it could deliver possibly 16 tons and the cost per ton delivered would be 31c. This is twice the cost of doing the work with FEDERAL Trucks.

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Traffic FEDERAL News

Published each month

IN THE INTEREST OF
ECONOMICAL TRANSPORTATION
by the
FEDERAL
MOTOR TRUCK COMPANY
DETROIT, MICHIGAN

Edited by: SIDNEY S. MERITHEW : L. B. DUDLEY

Records—Their Use

Getting Facts About Your Delivery System

SO MANY times have we heard or seen the expression, "we have no time for records," that we are prompted to investigate their advantages and disadvantages. Too much record, no doubt, is as bad as too little. What is the happy medium?

Some record is necessary, if not, let us destroy all clocks. Would we invest in trucks or erect large buildings that were not designed by engineers? We have not yet, and furthermore, we consider that the better the engineer, the better will be his building or truck. Can it be possible that the best delivery systems are built without the thought backed by facts that have been arranged for ready reference?

Leaks are but evidences of growing inefficiency. Delivery systems like books are measured by the predominating good points. Records give a foundation for stopping leaks. Foundations are laid to be used, not to fill up the space between some point in the ground and the first floor.

Every delivery system has its leaks known or unknown. Those records should be kept which will be used to stop the leaks. If when compiled they will not be used the time spent in collecting the data is wasted. Some one says, "If business interferes with pleasure, give up your business." We might suggest that if losses in transportation threaten your business, give up your business.

A more common sense way would be to search for your losses by the necessary records. **FEDERAL owners are offered the advice, help, and free record forms for improving their delivery service.**

Traffic News Mailed Flat Hereafter

BESIDES giving you a bigger, better TRAFFIC NEWS this month we are starting what we believe will be another big improvement. TRAFFIC NEWS will come to you without the fold in the center. This is a permanent 1917 feature.

We want you to be proud of your TRAFFIC NEWS file and have made this improvement for you. File your copies for future reference—they will prove of value when you want to improve your delivery system.

The Ton-Mile Basis for Cost Figures

(*Continued from page 3*)

by the use of either formula 5 or 6. Using (6) the result will be:

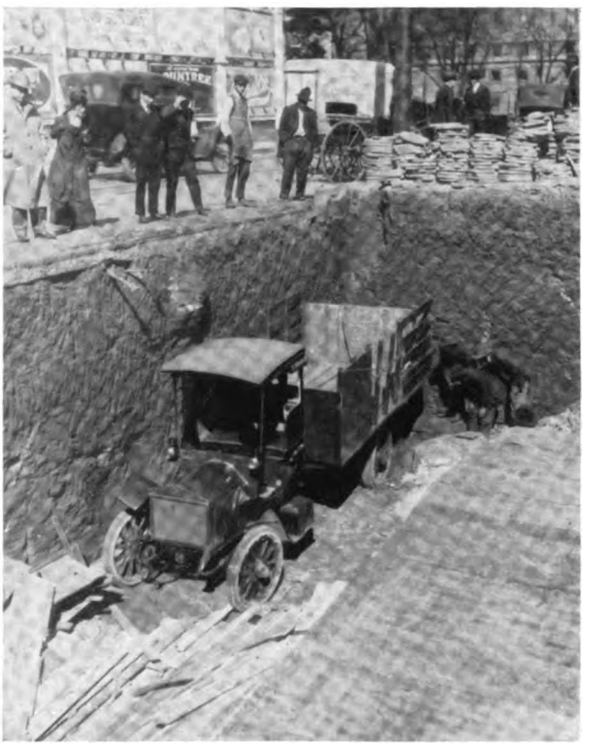
$$\frac{60}{60 \div 45} \times 1.5 = 67.5 \text{ Ton-Miles.}$$

Cost per Ton Mile

Figuring the cost per ton-mile is a simple matter when once the number of ton-miles are known, providing our costs are right. Costs however, are not a part of this article. The single statement, that, if the daily cost and the ton-miles are known simple division will give the ton-mile cost may be of interest in closing this article.

FEDERAL Sturdiness Again Demonstrated

Collision With Another Truck and a Fall of 14 Feet Fails to Do Serious Injury to FEDERAL No. 3910.



The above picture was taken just after the FEDERAL had been righted after alighting on its side at bottom of excavation

About November 1st, Atlanta, Georgia, had an exhibition of the way FEDERALS are built. This unexpected test proved beyond a doubt that the FEDERAL is built for extraordinary service.

This 1½-ton truck owned by the Southern Transfer Company, collided with another truck and was pushed over the edge of the excavation. At the time it was carrying a full load.

Although shown standing right side up, it landed on its side and was straightened up before a camera could be secured.

On the way down the radiator struck the pipe shown extending from the side of the excavation and a small hole was made in the radiator which was temporarily patched.

The fall was 14 feet but aside from bent fenders and running boards the truck showed no signs of its fall and was back at work again within an hour, mechanically O. K.

Shall the FEDERAL be equipped with heavier fenders?

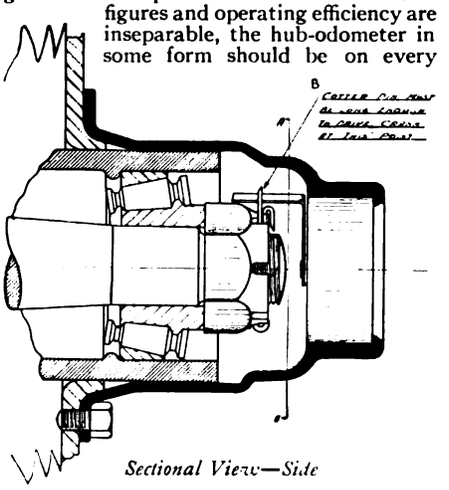
More Dependable Aid to Service Records

Supplementing Our Previous Articles on Similar Instruments

Another Hub-odometer

WHAT the speedometer does for the pleasure car, the hub-odometer accomplishes for the truck. The difference lies in the fact that the hub-odometer only shows miles travelled and not speed of travel, this being unnecessary on account of the inherent speed limitation of trucks.

Since mileage is the basis for most cost figures in transportation and because cost figures and operating efficiency are inseparable, the hub-odometer in some form should be on every truck. Proper adjustment of tires depends entirely on mileage which again is a reason for installing a hub-odometer.

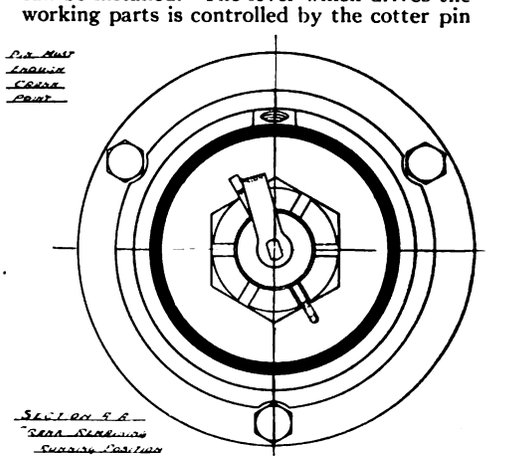


Sectional View—Side

The instrument shown this month has many commendable features, It is self contained in a special hub-cap which takes the place of the regular hub cap of either front wheel. It is constructed with a double back which is proven by test to be absolutely water, oil and mud proof.

Its Unique Drive

This instrument requires no additional work to be performed on the truck before it can be installed. The lever which drives the working parts is controlled by the cotter pin in the end of the steering knuckle. This drive is clearly shown in the cut above.



The instrument registers up to 99,999 miles and repeats. The relation of its working parts, its position at the end of the steering knuckle and the method of fastening it to the wheel, are clearly shown in the upper cut.

More detailed information will be furnished to any interested party about the instrument described, if a letter is addressed to the Traffic Engineering Department of the Federal Motor Truck Company.

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FEDERAL Drivers' Page

"In honestly striving for a creditable performance you dignify your work and your daily accomplishments become a permanent record that can be pointed to with pride"

Le Bon FEDERAL Pays For Itself In Nine Months

And gives better service, so says the Le Bon Bleach & Dye Works than the Express Companies and their own horse and wagon combined

FROM the smallest state of the Union comes many records of successful motor truck operation but perhaps none is more prominently successful than the one and one-half ton FEDERAL truck owned by Le Bon Bleach & Dye Works of Pawtucket Rhode Island. This particular truck is one of the very few which we can figure cost on what is known as the "full load" basis. This method is carefully explained on page three of this issue.

In the midst of a great manufacturing district, liberally supplied with producers of textile products, the Le Bon Bleach and Dye Works have found an excellent opportunity for the carrying on of their particular business. This business like many others is founded on service of a transportation nature. A successful pick-up and delivery system is absolutely essential.

The Situation

For a long time this firm depended on the co-operation of different express companies and their own horse units to keep up their reputation for quick deliveries. When trucks began to prove that they could give good and dependable service the Le Bon Company decided to try them out in their own business. They investigated the various makes of trucks then on the market and in the latter part of July 1914 bought a one and one-half ton FEDERAL No. 2096.

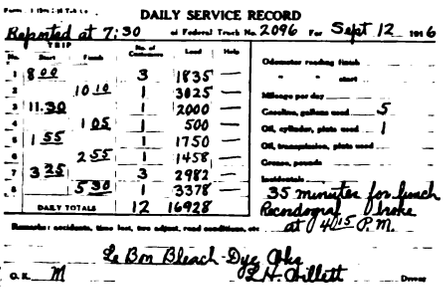
The working schedule set for this truck included trips around Pawtucket during the forenoon of every Monday, Wednesday and Friday. In the afternoon of these days it made a trip to Fall River a round trip distance of about 30 miles. On Tuesday, Thursday and Saturday of each week deliveries and collections are made in Pawtucket and Providence, and it is a general thing to have a capacity load going and coming at all times.

"Full Load" Basis

This last statement is the secret for economic transportation for any business. Unfortunately many forms of business cannot lay out a delivery schedule of this kind and this is the reason their unit costs appear so high. Always carrying a load is the ideal working condition.

The records reproduced on this page were secured through the use of the Recordograf described in our August issue and our Daily Service Records. a sample of which is shown. Across the bottom of the page is shown a part of the tape taken from the Recordograf for September 12th. This form of record makes it possible to locate every stop made during the day and the exact distance travelled between each stop.

The Daily Service Record shows us in the "Start" column the time at which the truck left the plant and in the "Finish" column the time at which it returned. Opposite the starting time is shown the load carried and the customers served on the outgoing trip. The loads carried and the customers served on the return trips are shown opposite the finish time for each trip. From the tape we can secure the standing time at each one of the deliveries. An analysis of the work of September 12th shows the following results.



DAILY SERVICE RECORD

Reported at 7:30 of Federal Truck No. 2096 for Sept 12 1916

Trip	Start	Finish	No. of Customers	Load	Mile
1	8 00		3	1835	
2		10 10	1	3025	
3	11 30		1	2000	
4		1 05	1	500	
5	1 55		1	1750	
6		2 55	1	1458	
7	3 25		3	2982	
8		5 30	1	3378	
DAILY TOTALS			12	16928	

Odometer reading finish ____ start ____
Mileage per day ____
Gasoline, gallons used 5
Oil, cylinder, pints used 1
Oil, transmission, pints used ____
Grease, pounds ____
Incidentals ____

35 minutes for lunch
Recordograf Broke at 4 Hrs P.M.

Remarks: accidents, time lost, tire adjust, road conditions, etc.

Le Bon Bleach Dye Wks
L.H. Willett
Driver

O.K. M

Running time	3 hrs.	3 min.
Miles travelled		32.75
Average trip distance		8.18
Gasoline consumed (gal.)		5
Miles per gallon		6.55
Pints of cylinder oil		1
Miles per pint		32.75
Cost per day		$ 5.88
Cost per ton		.69
Cost per ton-mile		.084
Cost per mile		.17



The FEDERAL Partner in the Firm of Le Bon Bleach & Dye Works

Analysis

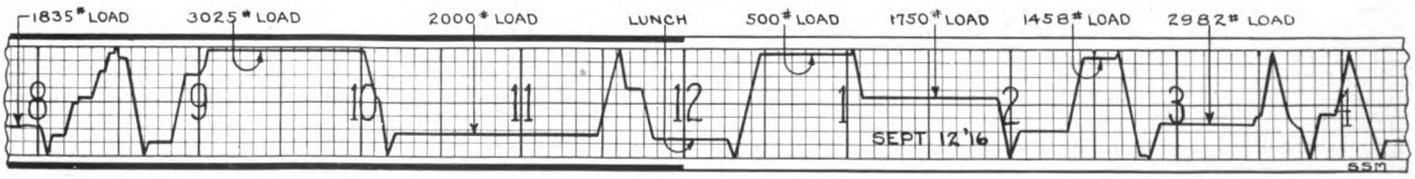
Number of trips	4
Deliveries	12
Loads in pounds	16928
Ton-Miles	69.20
Standing time at plant	3 hrs. 11 min.
Standing time on deliveries	3 hrs. 19 min.
Total standing time	6 hrs. 30 min.

The Driver

The importance of the position of driver for any truck doing this work cannot be emphasized too strongly. Mr. L. H. Willett, the driver of this FEDERAL has an important duty to perform and the record he has produced is evidence of his loyalty to his task. This statement taken from a recent letter received from the Le Bon Company shows the reputation which the FEDERAL and the FEDERAL'S driver have made with this Company.

"We find that we are able to do much more work at a lower cost with the truck than we formerly did with the different express companies and our horse and team, and furthermore, our first truck paid for itself in less than nine months."

Part of the Recordograf Tape for September 12th, Which Gives All Time Details of That Day's Work



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Things We Hear from New York

Frank Scolaro—Marble Works
Signed, R. Hanchrow.

My FEDERAL truck is used in carting manufactured marble from my factory to the various jobs.

The average mileage is about fifty per day, The furthest trip I have had occasion to send the truck was thirty-eight miles from here.

I have used other makes of motor trucks before, but find that the FEDERAL is the most efficient and economical truck to operate. It has never been laid up and has practically cost me nothing besides actual operating expense.

John J. Lake & Son—Painters Supplies
Signed, John J. Lake.

Our business is such that we cannot give you any exact mileage made but we should judge on an average of about 25 miles per day. We use it for carting all our freight from depot and making our heavy deliveries. We are glad to say we are perfectly satisfied with our purchase.

Geo. Vander May & Sons—Laundry
Signed, Nicholas Vander May.

The truck is used to collect and deliver family washes and makes an average mileage of about 175 miles per week, the longest run is about 10 miles from the laundry.

The truck has given us up to the present perfect satisfaction, our business has doubled due to the better service we are able to give our customers. For the time we have had the truck it has not been laid up a single day.

Loewus Bros. & Co.—Wholesale Liquor

We have used one of your FEDERAL trucks for two (2) years and same has given us very good satisfaction. We have just bought another one. This truck is doing the work of two teams. Average mileage is about 50 per day. The furthest distance we have gone from our place of business is fifty-five miles. During the two years that we have used your trucks, it was only necessary once to get outside help in getting back to the garage, which we think is a very good performance for the truck.

R. C. Talbot—Bus

I have been operating a motor bus in Ridgewood, N. J., since March 19, 1914. The bus is operated on a regular schedule, making about 75 trips per day, averaging about 80 miles, longest run is 1¼ miles. So far the truck has given excellent satisfaction.

Studebaker Corporation of America—Manufacturers.

We are pleased to say that the truck has been very satisfactory. During the sixteen months the truck has been in service it has cost us less than $50.00 for repairs and is now in good condition and doing excellent work. We feel that we got a very good bargain.

Lacour, Cranmer & Co.—Building Material.

We are absolutely satisfied with the FEDERAL truck in every respect, not having in mind any one thing that we could find fault with. It has given us perfect service and we have not yet up until this time had it out of commission one hour, for repairs or for anything else, and in closing would say that we have only the highest commendations for the FEDERAL truck and feel confident in saying that we are in a position to recommend its use to anyone who might desire a motor for heavy truck work.

Anderson Auction Co.

Our truck is used for delivery and calling for material sold by this house consisting of books, paintings, furniture and various other objects of art. This at times means very heavy loads as we frequently receive consignments of books numbering several thousand volumes which are loaded in the truck and carried as a floor load. As you know loads of this kind are very heavy. Most of the work done by our truck is in the city making deliveries from the battery to the city limits. It has done work outside of the city, the longest trip being as far as Northport, L. I. The truck has been doing very satisfactory work. We have put it to two or three severe tests and found that it met our hopes and expectations in every way.

Adolf Gobel—Meats Products
Signed, Eronk Gobel.

I can say this much that I have used the truck at 10,000 miles in all kinds of weather without a break-down, she never failed during the snow storms last winter and I guess she will put in a few more winters.

American Bank Note Company
Signed, A. C. Cary, Vice. Pres.

I beg to state that our FEDERALS are used for delivery purposes and average about twenty-eight miles per day. Our longest run has been thirteen miles. The trucks have given good satisfaction.



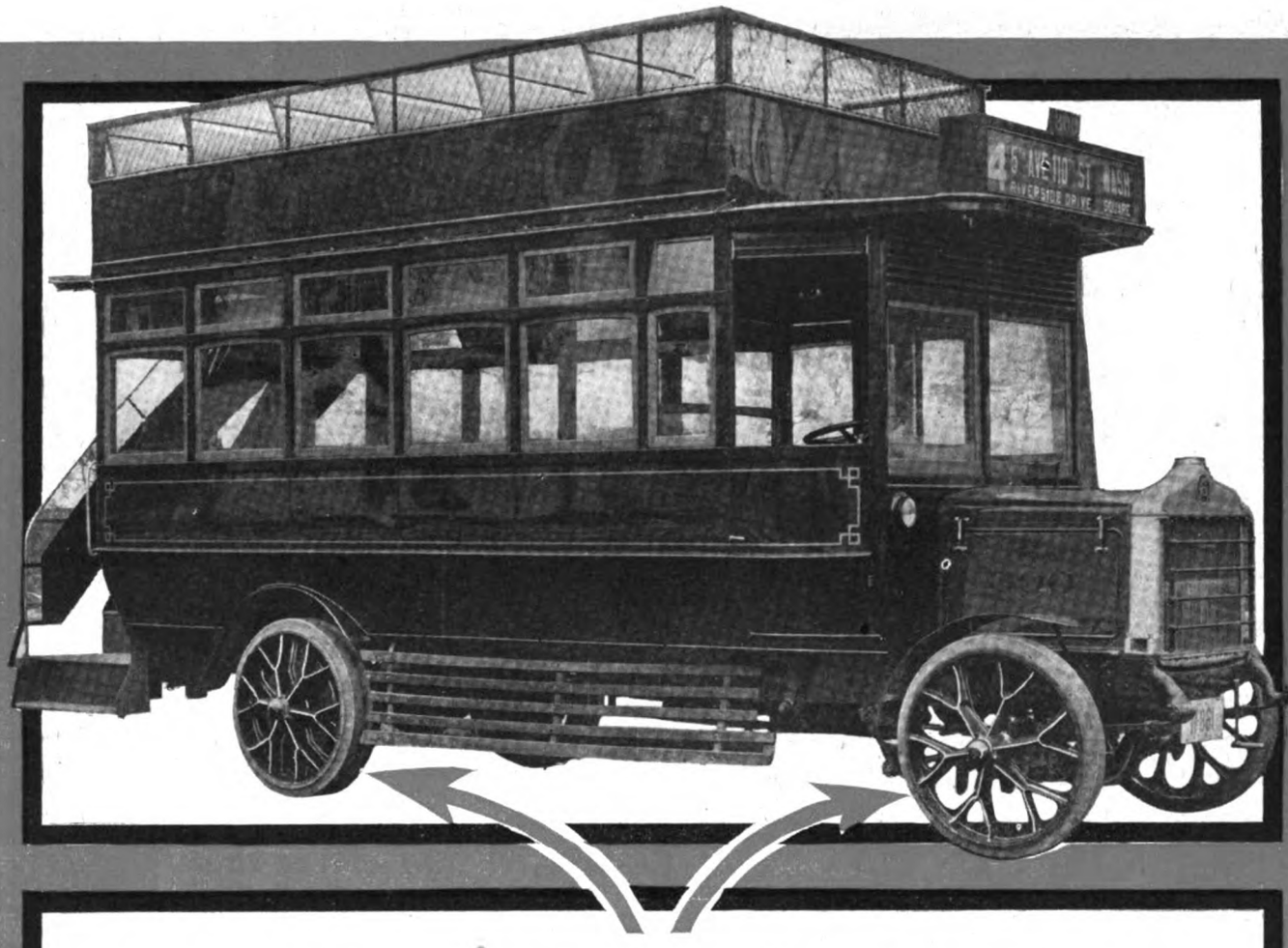
This scene with a big FEDERAL topping the hill is not an artist's conception but was made from actual photographs of the famous Wayne Street Hill, Detroit. The hill is closed to horse traffic because of its steepness, and the sign reasons drivers of this fact. This advertisement appears next month in the leading Review publications and also on the back cover of the Metropolitan Magazine Dealers Supplement in six colors.

Brooklyn News Company—Papers

In the first years of service our truck made 16,440 miles. The nature of the work is delivery of newspapers and magazines. The deliveries are within the city limits and comprise a large number of deliveries averaging some two hundred stops a day.

The FEDERAL has given us the best service out of four makes of trucks that have been tried by us.

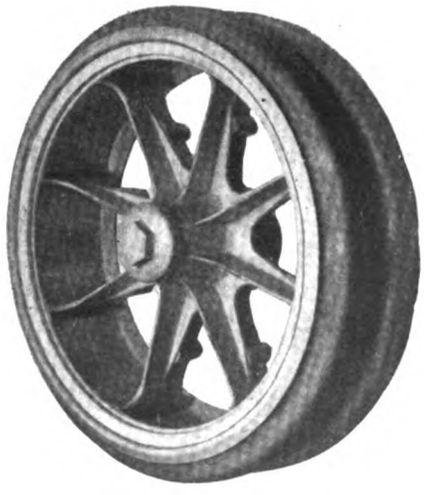
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WEST'S CAST STEEL WHEELS

The Fifth Ave. Coach Co. has adopted Cast Steel Wheels as Standard Equipment.

The biggest and best Truck Manufacturers now specify Steel Wheels



WHY???

Because they recognize the fact that the exceedingly rigorous conditions to which the wheels of heavy vehicles are subjected require maximum strength to resist shocks and strains, and the ability to stand up well under the wear and tear of continuous service.

35,000 West's Cast Steel Wheels now in service Sold on Satisfaction Guaranteed.

The West Steel Casting Co.
Cleveland Ohio

"Watch the West Cast Steel Wheels Go Round"

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The OTIS ELEVATOR COMPANY *announces that*

Otis Worm Drive Axles and Electric Steel Wheels will be exhibited for the first time at the forthcoming Chicago Automobile Show, where truck manufacturers, dealers and users will have excellent opportunity to study and inspect these latest developments in worm drive axles and steel wheels.

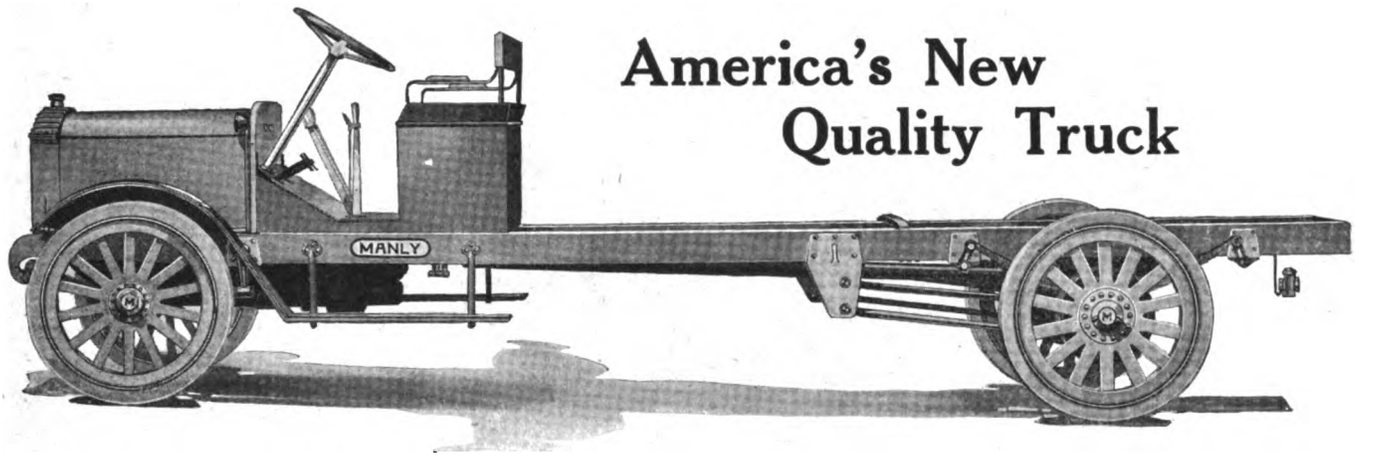
Otis Worm Drive Axles will be found to be of most advanced design, embodying many refinements, and both Axles and Wheels of high-grade workmanship and structural quality throughout.

Exhibited on Second Floor Rear of Coliseum Annex, Chicago.

Please address all inquiries to
INDUSTRIAL DEPARTMENT

OTIS ELEVATOR COMPANY
ELEVENTH AVE. AND TWENTY-SIXTH ST., NEW YORK

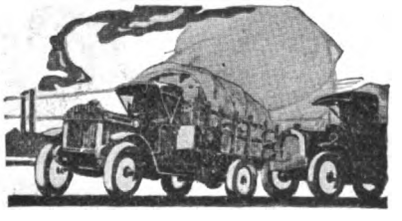
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America's New Quality Truck

MANLY

1½-Ton 2½-Ton TRUCKS



NOW comes the realization of a new ideal in truck construction! For years a place has awaited a truck of MANLY qualifications in the commercial world. MANLY now definitely steps into that place—exploding old theories, erecting new standards.

Just another truck would mean nothing. But the timely appearance of a truck built **conservatively** upon the composite experiences of every successful truck manufacturer in the industry and then improved just as conservatively in accordance with the latest American and foreign engineering practice—these points emphatically differentiate and individualize the MANLY.

Twenty Remarkable Constructional Features—features prove in the fire-test of actual service to be of money-saving merit to users and sales creative value to dealers—set MANLY Trucks in a class far up among quality commercial vehicles.

Wire or write for advance information or visit our factory during Chicago Show Week. Handsomely illustrated catalog sent on postal request.

Territorial arrangements now being made for early deliveries.

MANLY MOTOR CORPORATION

Factory

Waukegan, Illinois

General Offices

1432 Michigan Avenue, Chicago, Illinois

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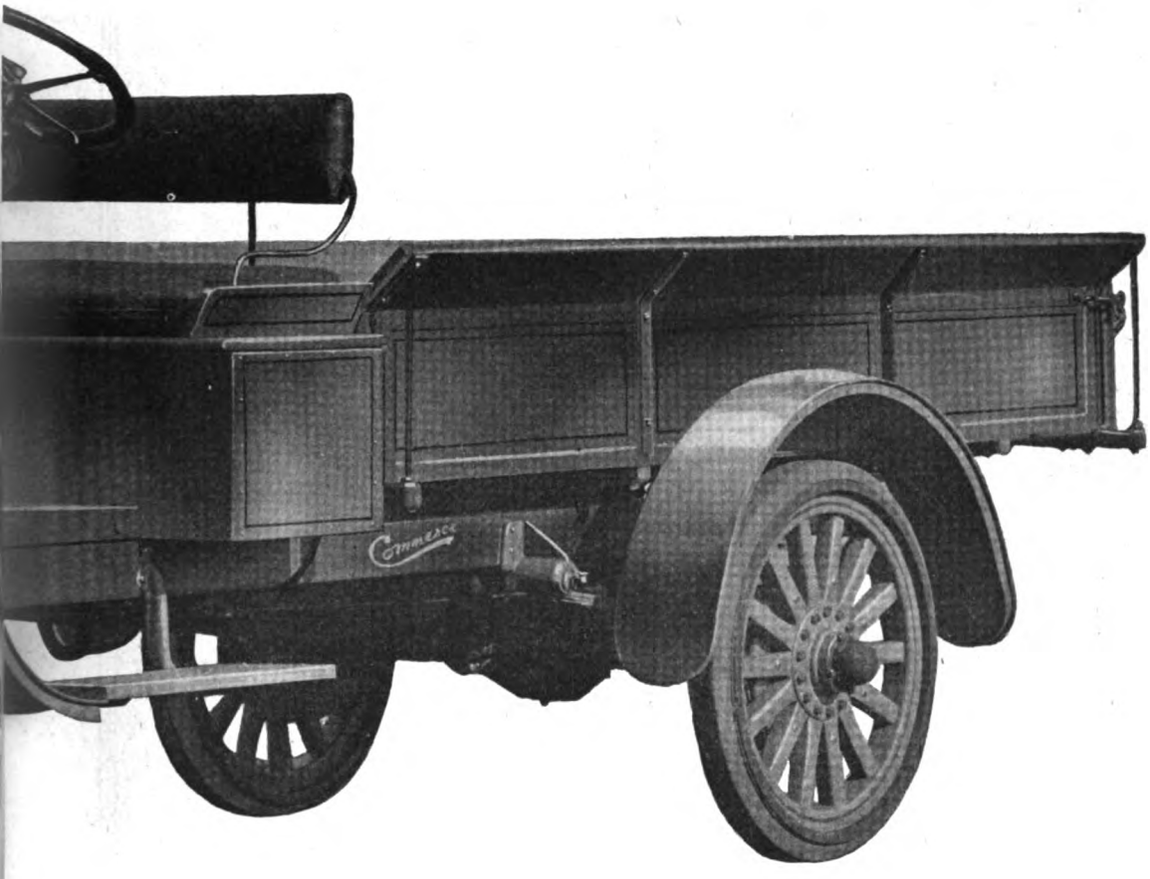


A Year Ahead of Other Trucks!

Commerce

One Ton Completely equipped with Starting and Lighting System, Windshield, Stewart Vacuum System, Bumper, Pierce Governor and Open Express Body—Internal Gear Drive. **$1175**

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COMMERCE Trucks are fully a year ahead of every other truck in point of complete equipment.

And this equipment is **needed!** Don't make any mistake about that. **Next** year, and the year after, you will see truck after truck falling into line, with complete equipment.

But none of the others have it NOW! Some of them have selfstarters; some have lighting systems, some have bumpers, others have spotlights—

But the Commerce Truck is the only one that has **ALL** of these things (and several others, including a windshield) **NOW—TO-DAY!**

So, if you want a truck to use now, or this year, buy a Commerce. It's the same price—and that price **INCLUDES** all this necessary equipment. You don't have to pay extra for it, and wait for it to be put on.

The Commerce is sold as a complete truck, ready to get in and drive off. Three types of bodies furnished. Handled by leading dealers all over the United States.

DEALERS: This is an especially strong point for **You!** If you are going to sell a complete truck, why not sell it **now**—instead of **next** year? Give your customers a 1918 truck **this** year. They will appreciate it. We give you generous terms—and the **shortest,** clearest Dealer's Agreement you ever saw.

Look at These—Included in the Price!

A windshield. Remy Starting and Lighting System. A Spotlight. A Bumper (integral part of frame). Large Searchlights fitted with dimmer lamps. Stewart Vacuum System. Pierce Automatic Governor.

And at These Indications of Quality!

Continental Motor—Torbensen Internal Gear Rear Axle—Cast Tank Radiator with removable core—Truck Type, Roller Bearing, Front Axle—Unit Transmission, special truck type—Detroit Steel Products Company Springs. These, together with a special truck frame and fittings such as are usually found in a truck of 2 tons' capacity, are the principal units that enter into the construction of the "Model E" Commerce 1-ton Truck.

¾ Ton Model, $975. Supplied with 3 types of bodies

Commerce Motor Car Company

DETROIT **MICHIGAN**

W. H. Brinkerhoff, Eastern District Manager, Belmont Avenue, Elmhurst, Long Island, N. Y.

PLEASE MENTION THE COMMERCIAL VEHICLE WHEN WRITING TO ADVERTISERS

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THE FEDDERS RADIATOR

is a product of the best workmanship. It is subject to thorough test. We give our product its character. But you can judge it best however where it is in actual use.

In the mechanical world more than in any other a commodity can be judged by the company it keeps. The quality of the car and truck on which you will find the Fedders Radiator is the best foundation for its reputation. What better foundation can a radiator have for its reputation, among non-users.



The manufacturer producing a reputable product has learned to ask not whether a thing is popular, but, "With whom is it popular?" You will find Fedders Radiators on some of the best makes of pleasure cars and on the largest and most successful trucks. A number of car manufacturers have used the Fedders Radiators since they were first made — nearly twenty years ago.

FEDDERS MFG. CO.
BUFFALO N. Y.

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STEGEMAN 6 (SIX CYLINDER) TRUCKS

Power Without Vibration

Makes the Six Master of the Situation

THE STEGEMAN is the only line of trucks powered with Six-Cylinder Motors. This has proved the most sweeping developement in the truck industry. A year's continuous tests have demonstrated the Stegeman Six-Cylinder undisputed master of the truck situation.

Leading S. A. E. Engineers declare the Six the superb power plant because the power impulses overlap, giving a continuous pull ***without vibration.***

Sizes:
1½
2½
3½
5 and 7
TON

A YEAR'S TESTS SHOW MORE POWER, LESS GAS

The Stegeman has stood the severest strain and stress of heavy duty service. McDonald of Red Rock, Arizona hauling ore and freight says, "I have grades averaging 25% and travel 100 miles each day over rough roads and get 5½ miles to each gallon of gas—hauling both ways". Hartje the Chicago Roadbuilder says, "I'm tickled to death with my pair of 7-ton Stegemans. They have tremendous power and drag any load I can pile on without vibration. They cost $1.00 per day less for gas and oil than any of my other trucks"

STEGEMAN AGENTS BEAT COMPETITION

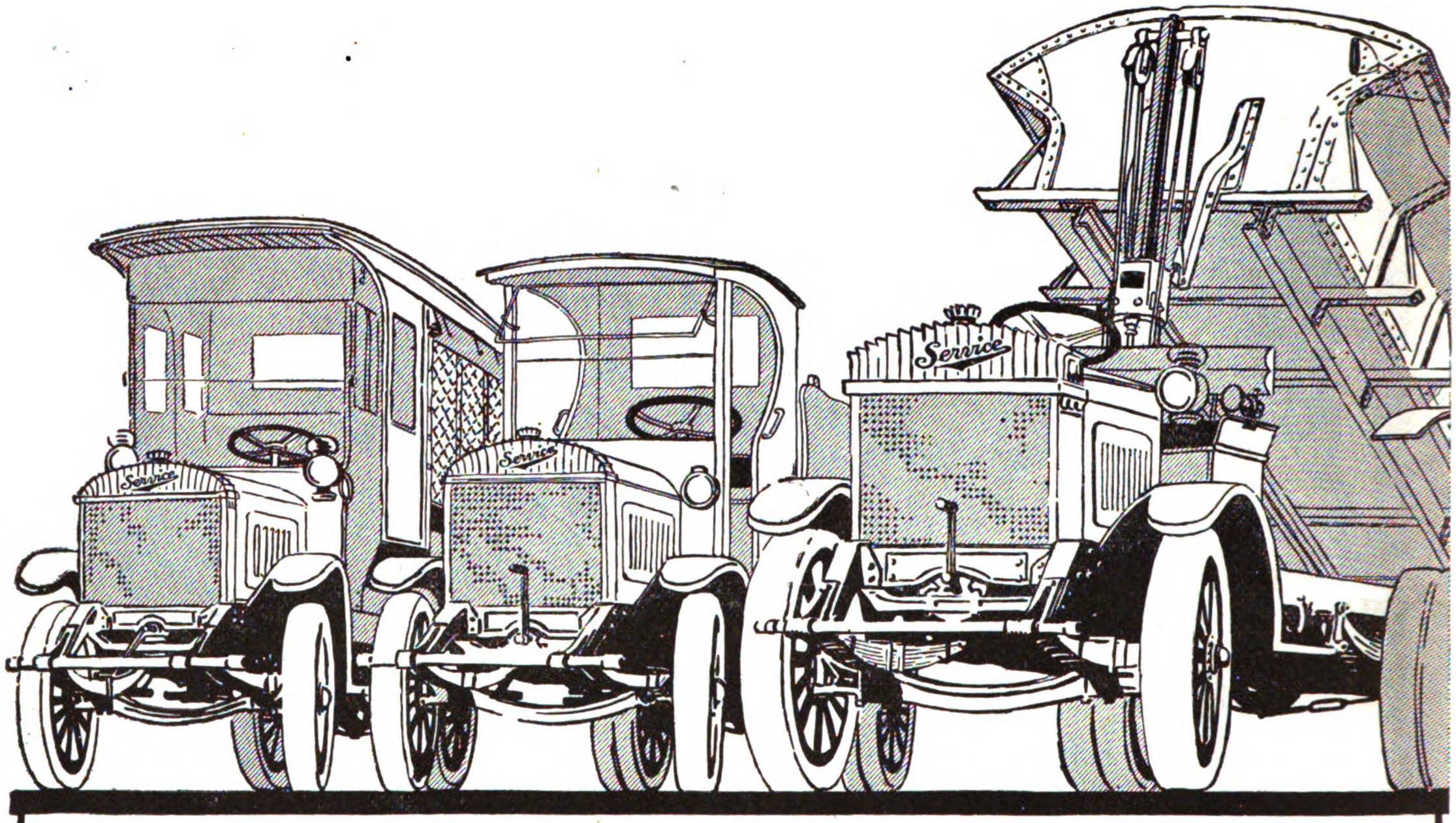
The Stegeman Six has a bunch of selling proof and evidence. It's the truck with which you can side-track competition, because it possesses features buyers want—and other dealers can't supply. Write for vacant territory and selling plan.

Send today for our catalogue and circular on axle construction.



Stegeman Motor Car Co. Milwaukee

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1½ ton model—suitable for general transportation for transportation companies, expressage and trucking where speed and low cost maintenance must conbine in a vehicle of good capacity. **$1950.**

2 ton model—a heavy duty truck of medium capacity combining the speed of the lighter models with the strength necessary to economical hauling of heavy loads. **$2250.**

5 ton model—the largest Service truck displacing other trucks of heavier rated capacity in the handling of unusually large loads of extreme weight. **$4000.**

Service Trucks Are Built in Six Models—1 to 5 Tons

10 Dominant Manufacturers Built Extra Well

Ten big motor truck manufacturers stand out prominently as those whose product finds biggest use among the large concerns who buy carefully. The stability of these ten manufacturers is assured—their combined capitalization is $250,000,000; the value of their yearly output runs high into the millions. Each builds the best truck he can. Each offers guarantees backed by tremendous resources, tremendous manufacturing facilities, big strong organizations, established business reputation.

In essential specifications, established practice is closely adhered to. Eight build trucks in excess of four ton capacity. All build from one to four ton.

Yet with all the tremendous competition, with the tremendous manufacturing efforts to build the best, SERVICE motor trucks stand out among the ten with certain definite marked advantages of big value to purchasers.

Only one of the ten furnishes tires on all types that equal SERVICE in size.

Only one other is built to operate with perfect safety at the same high speed.

SERVICE is the only one of the big ten using the vacuum feed system, assuring maximum fuel economy, steady uniform fuel supply.

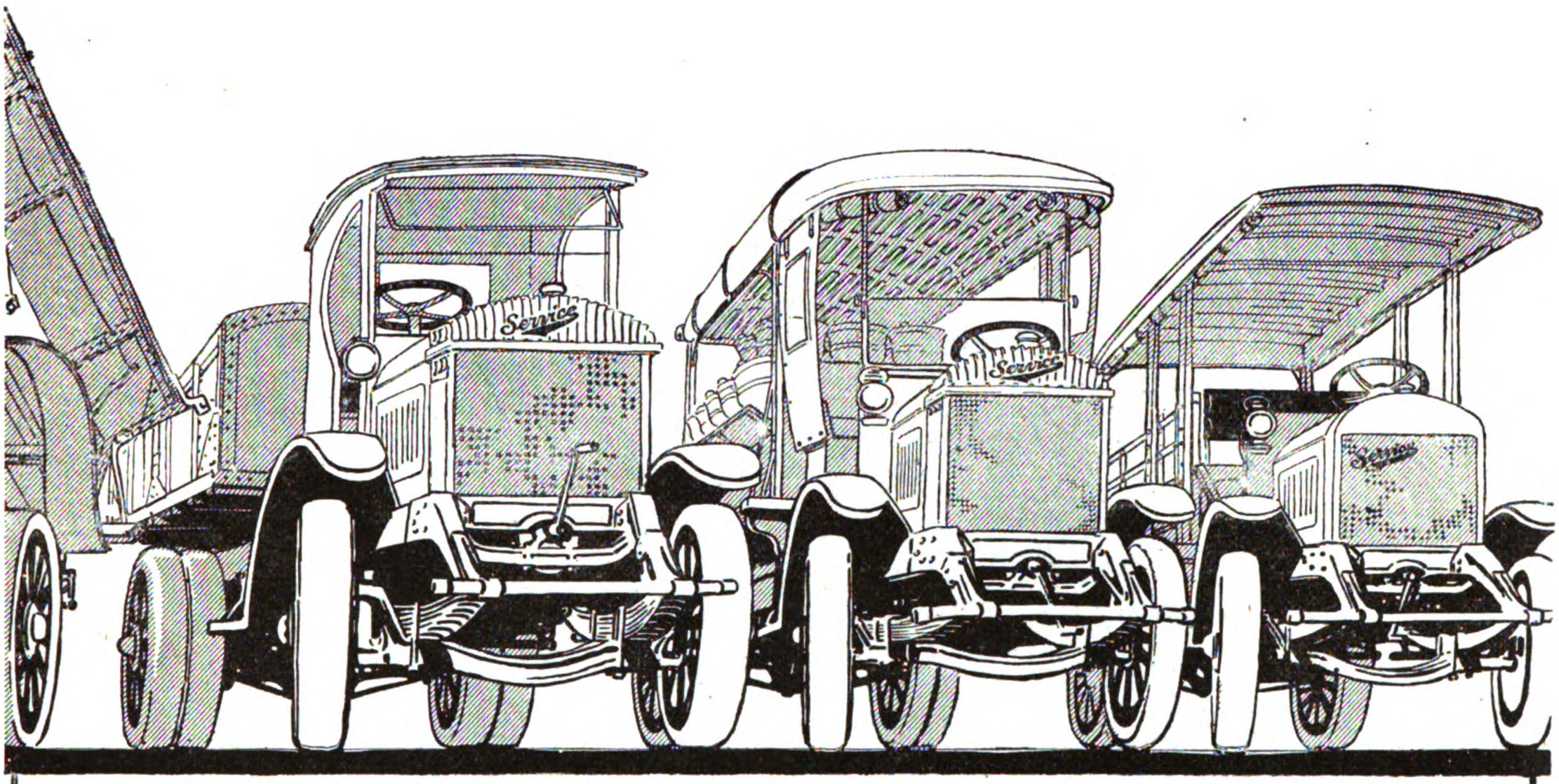
Eight use the worm drive, but SERVICE worm drive construction is the strongest that manufacturing ingenuity can devise.

Nine use pressed steel frames, but in the SERVICE motor truck pressed steel frame greater width of flange, depth of frame, more uniform distribution of load assuring maximum resistance to driving stress and strain, clinch SERVICE superiority.

Five use motors of same power as SERVICE, yet SERVICE shows a 11% higher rating than the other four trucks of equal load capacity.

In chassis size SERVICE gives greater loading length than any other of ten. This means a larger loading platform—greater carrying capacity—greater even distribution of load. Yet with these points of leadership and with every other feature of construction duplicating even the most expensive of the trucks manufactured by these ten big manufacturers, SERVICE presents a lower initial cost than any of the other nine.

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3½ ton special model — a contractor's truck with highly specialized specifications, including an over-size motor and superior strength on the frame for heavy trucking service. **$3250.**

3½ ton regular model — a heavy duty truck adaptable to a wide range of heavy duty service where sturdiness and strength must combine with satisfactory maintenance cost and low depreciation. **$3000.**

1 ton model — admirably adapted for light, rapid delivery for a wide range of industries, unusually economical to operate. **$1375.**

Service Trucks Are Built in Six Models — 1 to 5 Tons

Service Motor Trucks

Build Up a Real Business

60% of each year's business in Service Trucks is in repeat orders—you are sure of a 60% increase each year in your sales—without additional sales effort.

And all the time your new business is growing and duplicating—adding to your profits—to your business development.

Service Trucks are the choice of the biggest—the most careful truck buyers—of the men whose initail orders are most frequently the basis for future fleet equipment.

Ten Truck Makers Dominote in Sales—and among these Service Alone Shows Distinct Features of Real Superiority.

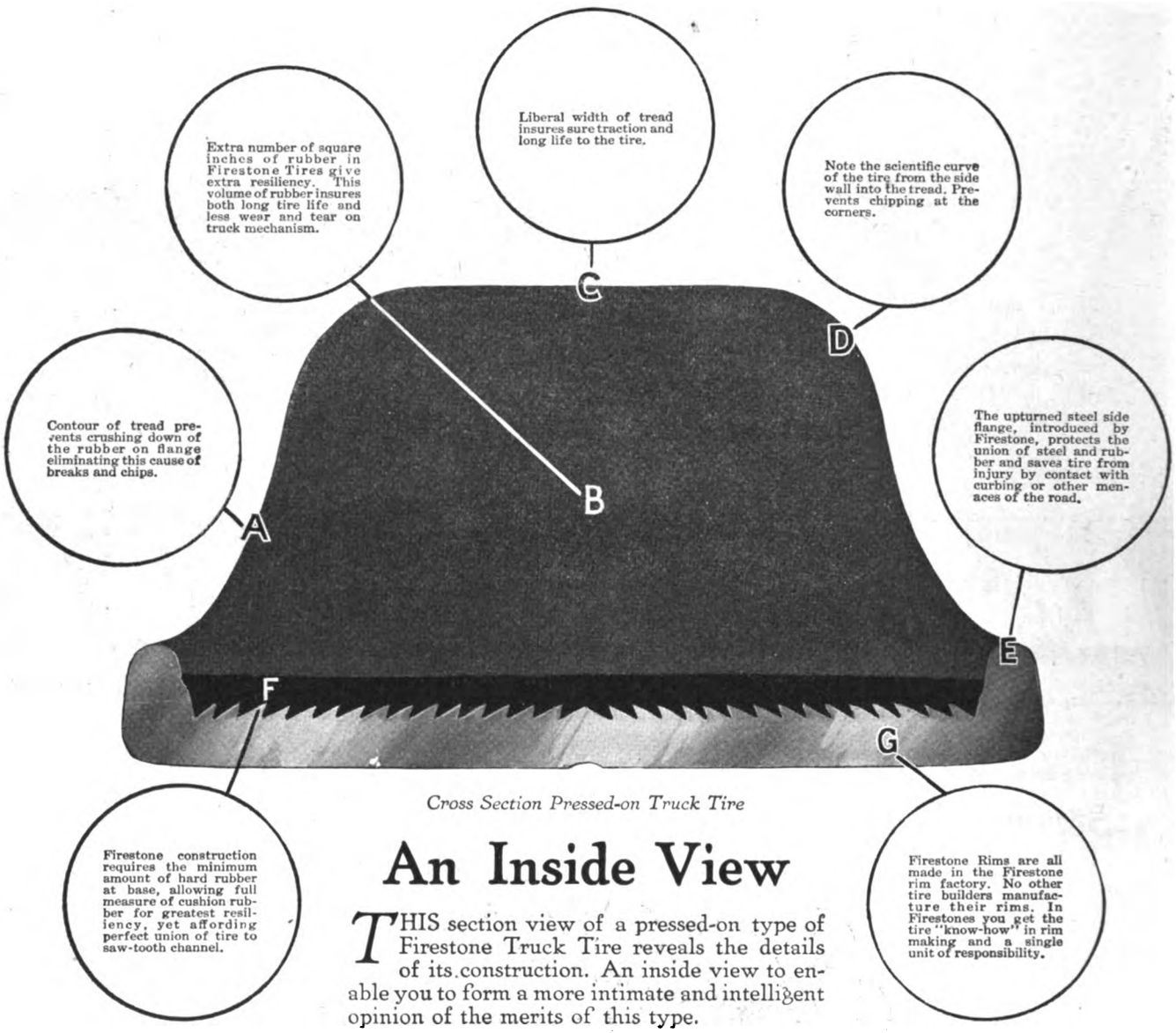
Compare constructional features—every detail of design—equipment—general specifications. The real advantages of Service—Built by Specialists—are at once apparent. **Write for Our Big Dealer Proposition**—it is a selling opportunity you cannot afford to miss.

Service Motor Truck Company

Main Office and Factory
Wabash, Indiana
Dept. V

Chicago, Ill.	Omaha, Neb.	Buffalo, N. Y.	Baltimore, Md.	Pittsburgh, Pa.	Philadelphia, Pa.
New York, N. Y.	Boston, Mass.	Salt Lake City, Utah	Columbus, Ohio	Washington, D. C.	Rochester, N. Y.
Butte, Mont.	Brooklyn, N. Y.	Milwaukee, Wis.	Cincinnati, Ohio	Savannah, Ga.	Tulsa, Okla.
St. Louis, Mo.	Newark, N. J.	Bridgeport, Conn.	Youngstown, Ohio	New Orleans, La.	Detroit, Mich.
Louisville, Ky.	Indianapolis, Ind.	Des Moines, Iowa	Canton, Ohio	Hoboken, N. J.	Denver, Colo.

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Cross Section Pressed-on Truck Tire

An Inside View

THIS section view of a pressed-on type of Firestone Truck Tire reveals the details of its construction. An inside view to enable you to form a more intimate and intelligent opinion of the merits of this type.

When pressed on to the wheel by means of an enormous hydraulic press, tire and wheel practically become a unit. Nothing can remove this tire except the same type of hydraulic press. An advantage of the pressed-on tire, aside from its grip on the wheel is its lighter weight.

Study the specifications, briefly outlined.

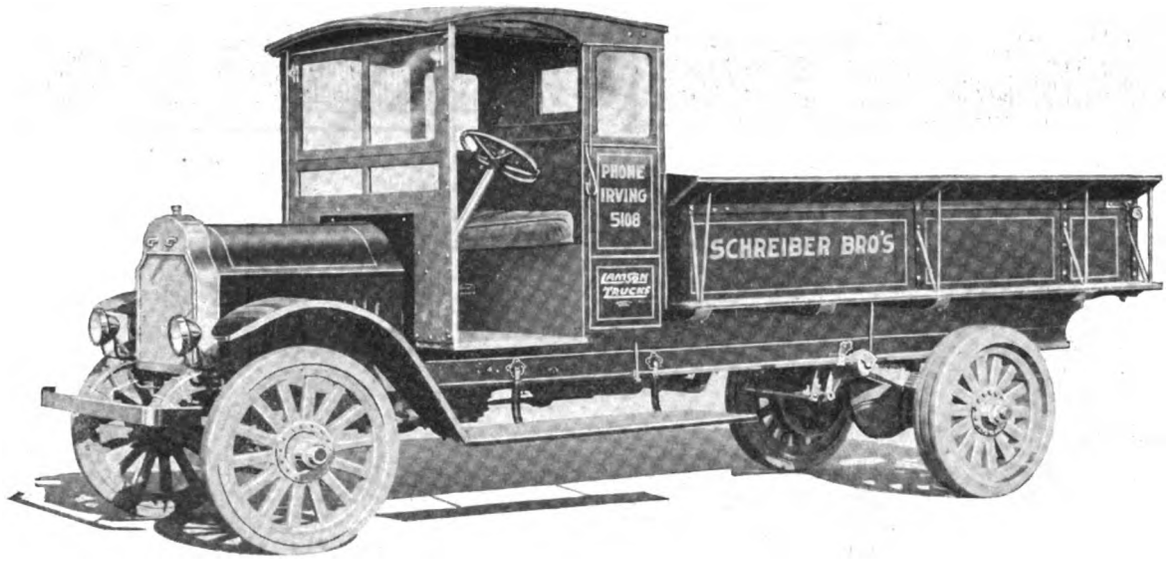
There is a Firestone Truck Tire for all roads, loads and conditions of service.

Will you make use of the services of one of our experts in the selection of your truck tire equipment?

FIRESTONE TIRE AND RUBBER COMPANY
Akron, Ohio Branches and Dealers Everywhere

Firestone TRUCK TIRES

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LAMSON TRUCKS

Large and Sturdy for Severe Service

FIVE SIZES—1, 1½, 2½, 3½ and 5 Ton

LAMSON TRUCKS embody the highest class specifications, uniformly throughout the line. They are built up to a standard by which they have made an enviable reputation.

DEALERS: Get into the truck business right. Associate with a product having an established value and with a company that is interested in its customers long after the sale is made.

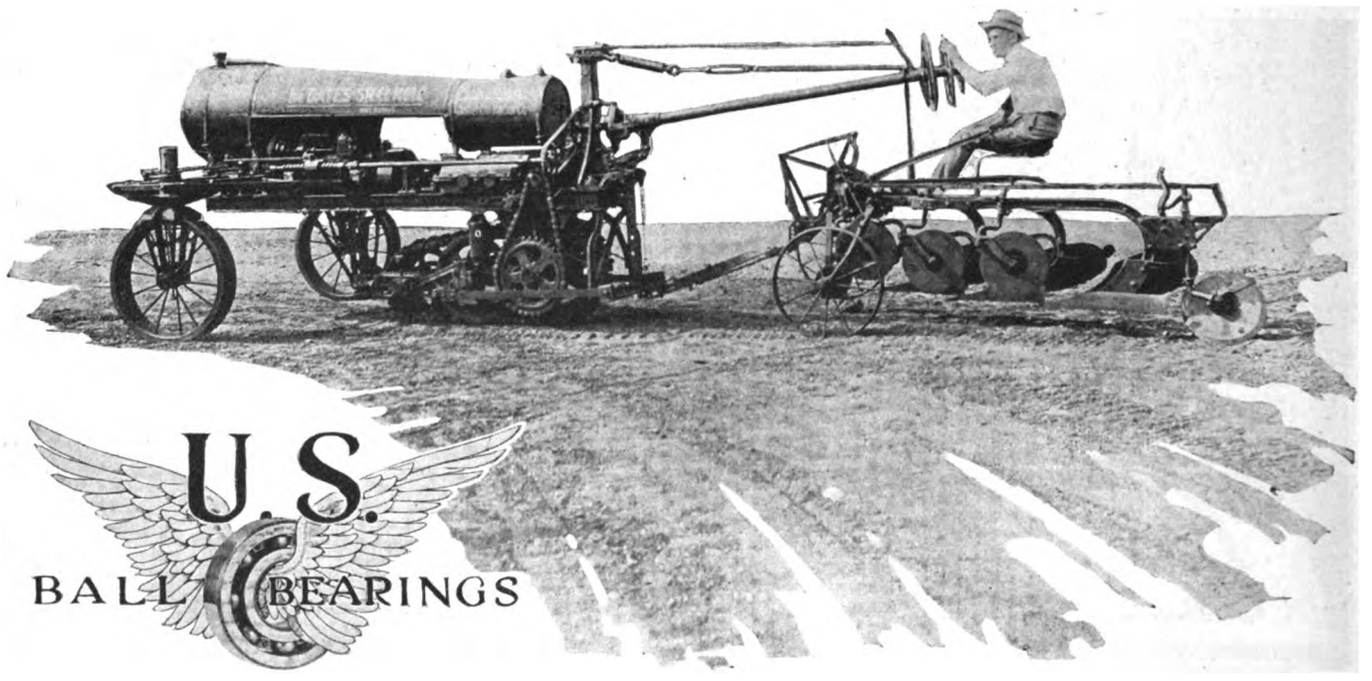
If you are the "live wire" of your territory we want you and you will want the Lamson agency when you know all about it. Better write today.

Every User of a Lamson Truck Is a Booster—A Salesman

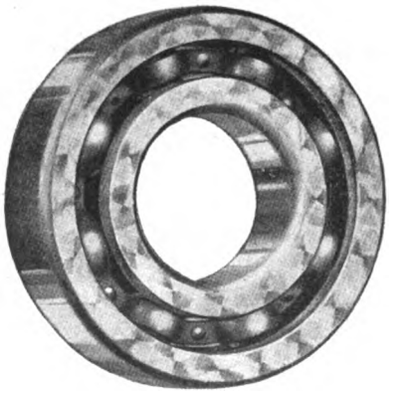
LAMSON TRUCK & TRACTOR CO.

4644 W. Madison Street **Chicago, Illinois**

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No Matter How It Twists—



If ever any one adaptation showed the super-efficiency of ball bearings it is their use in tractor building.

Slewing and skidding and jolting over rough farm lands and ditches, the tractor is subjected to unusual and exceptional strains such as are seldom encountered by any other piece of machinery. From every direction they come—these unusual jolts and blows—until one marvels that the mechanism stands up at all.

High tribute is it to ball bearings that they are called upon to withstand these strains in the really vital parts of the leading makes of tractors—and still higher tribute to U. S. Ball Bearings that they in particular are chosen to perform this grievous work.

And still it is no surprise that U. S. Ball Bearings should be chosen, for it is a matter of common knowledge among engineers and manufacturers that U. S. Ball Bearings are exceptionally well fitted to meet just such exceptional and unusual demands.

U. S. Ball Bearing Manufacturing Co.

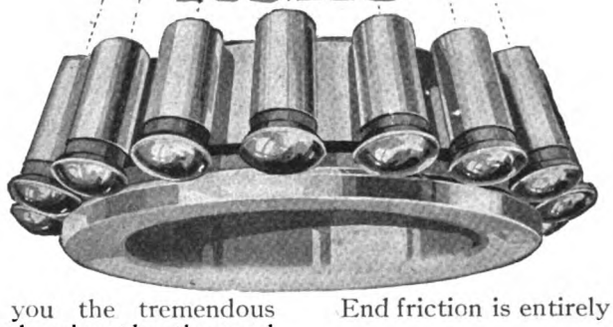
(Conrad Patent Licensee)

Palmer Street and Kolmar Avenue, Chicago

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BOCK

Everything Rolls



Bock Bearings give you the tremendous strength of the roller bearing *plus* the good features of the ball bearing.

Consequently the Bock will carry *much heavier loads*—and will *outwear* any other roller bearing.

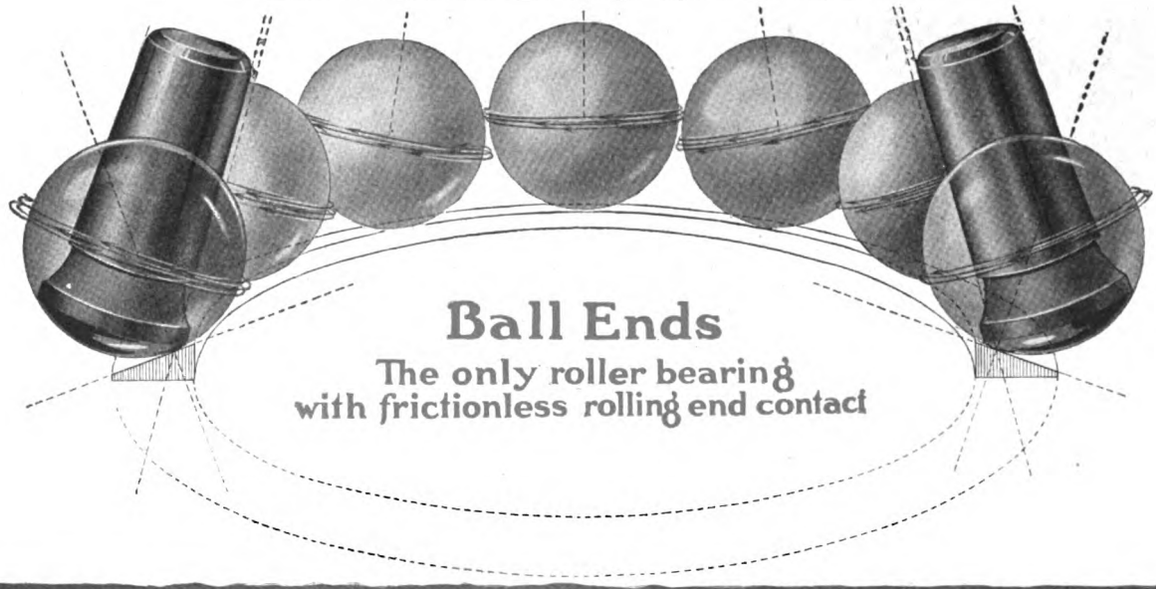
The bearing end of each Bock roller is a segment of a perfect sphere. So where other bearings merely slide and scrape, the Bock *rolls*.

End friction is entirely eliminated.

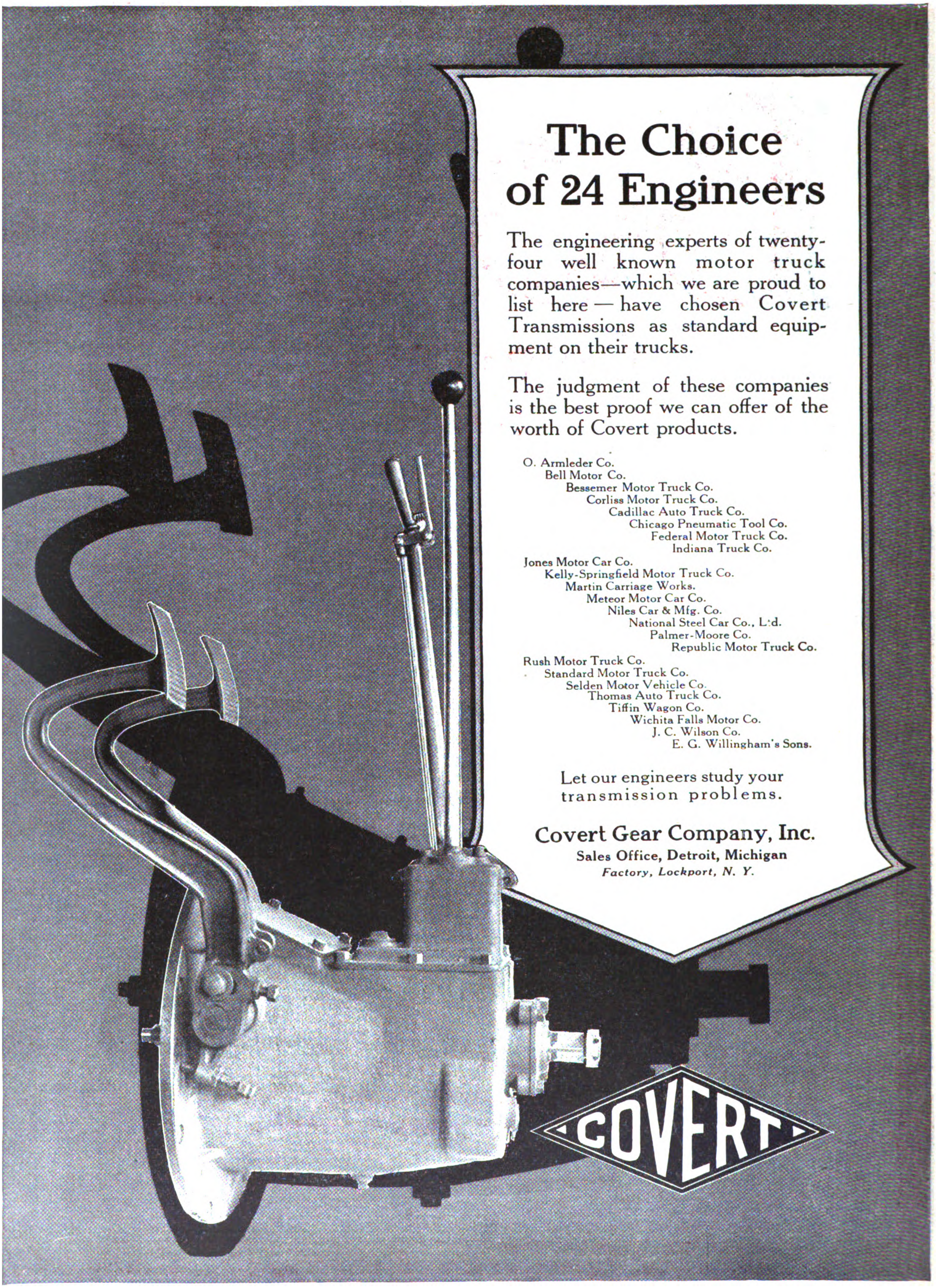
Everything rolls.

Engineers everywhere have enthusiastically shown their approval of the exclusive Bock features—and as a result Bock Bearings are replacing all other types of motor car bearings just as rapidly as we can supply them in sufficient quantities.

The Bock Bearing Company, Toledo, Ohio



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Announcing

THE WINTHER

First and Only American-Made Heavy-Duty Internal-Gear-Driven Motor Truck

Dealers and motor truck users, who have long awaited the perfection of an internal-gear-driven motor truck of heavy carrying capacity, will be more than usually interested in the announcement of the WINTHER Truck.

Model 57; Maximum, 5000 lbs.
Model 87; Maximum, 8000 lbs.
Model 127; Maximum, 12,000 lbs.

The WINTHER eliminates the noise and annoyance of the cumbersome chain drive. It abolishes the weight and intricacies of the worm.

Built by master builders, from the best American materials, we respectfully submit the WINTHER for your approval.

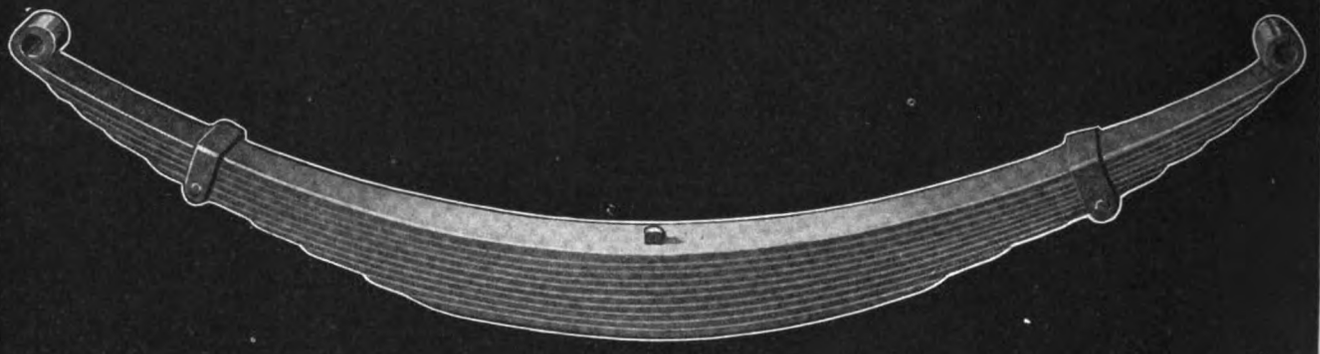
An exceptionally interesting offer is open for a few high-grade dealers.

Winther Motor Truck Company

Kenosha - - - - - - - Wisconsin

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"The Spring Is the Thing"



MATHER

Scientifically Heat-Treated

SPRINGS

designed to insure

Maximum of Elasticity and Endurance

with

Minimum of Vibration

Genuine made only by

The Mather Spring Company

Toledo, Ohio

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In Chicago Big Business Moves on United Trucks

Big loads—fewer trips—less operating expense with a minimum of depreciation and upkeep cost is the manner in which Chicago business men are handling their heavy duty hauling. Prominent among Chicago users are such firms as Carey Brick Company, H. Hoffenkamp & Sons and Chicago Fire Brick Company

Every day more concerns are realizing the true economy of hauling their material in big loads. Large fleet owners, contractors, operators of sight seeing buses and merchants using only one or two trucks are unanimous in declaring it the real efficiency method.

United Trucks are designed essentially for the kind of service that big business demands—strong and powerful enough to endure in the hardest service possible. Their design embodies only standardized parts of recognized merit and the man who knows truck values is quick to comprehend the superiority of the United line.

United Trucks are made exclusively for heavy duty hauling in 2, 3½, 4 and 5 ton sizes —all worm drive. Nearly sixty per cent. of the heavy duty truck manufacturers are today using this silent, economical and satisfactory worm drive construction.

We have a limited amount of choice territory still open, and would like to hear from dealers who are awake to the possibilities of the truck business.

UNITED MOTORS COMPANY

672 North Street - - Grand Rapids, Mich.





A horse makes a good *monument*, but—

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James M. Naye, Teamster, Water & Tasker Streets, Philadelphia, says:

"As requested, I am pleased to advise you that the rear Polack tyres which you replaced on the Mack 5 ton truck ran 12,780 miles.

"Considering the hard service of our hauling for the McCahan Sugar Refining Co., I consider this remarkable mileage on a heavy truck of this type, in fact I have been so well pleased with your tyres in the four years that we have used them, that I specified Polack tyres on the new truck that I purchased.

"I will add that your methods have made it a pleasure to do business with you, and my decision remains unchanged to use nothing but Polack tyres on my trucks."

10,000 MILES GUARANTEE INVARIABLY EXCEEDED

POLACK TYRES

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AUG 18 '16

The COMMERCIAL VEHICLE

Volume XV
Number 2

AUGUST 15, 1916

Twenty Cents a Copy
Two Dollars a Year

Emergencies! In the business of war Packard chainless trucks have made good under every test

Down—down below the border, in a hostile, roadless country, dust-proof Packards have doubled the *hitting power* of Pershing's army.

Unfailing desert freighters they have been—keeping the long lines open—the camps supplied.

And after Carrizal, they took on a real fighting job. Then Pershing concentrated his forces and held hundreds of trucks ready to rush regiments and guns to any threatened post.

For the first time, American infantry could travel farther and faster than cavalry—in a pinch, 125 miles a day.

The twenty-four-hour chainless Packards helped to keep the peace in Mexico by extending Pershing's fighting range.

That's the reason the government has multiplied its first order twenty-six times—from 27 to 716 chainless Packards—in a little more than three months.

This same tested speed, stamina, flexibility and economy—this ability to stand up under staggering road conditions and overloads—will handle your emergencies—cut your hauling costs—expand your sales—increase the range of your business and its hitting power. Write Detroit.

Packard
CHAINLESS
TRUCKS

Ask the man who owns one

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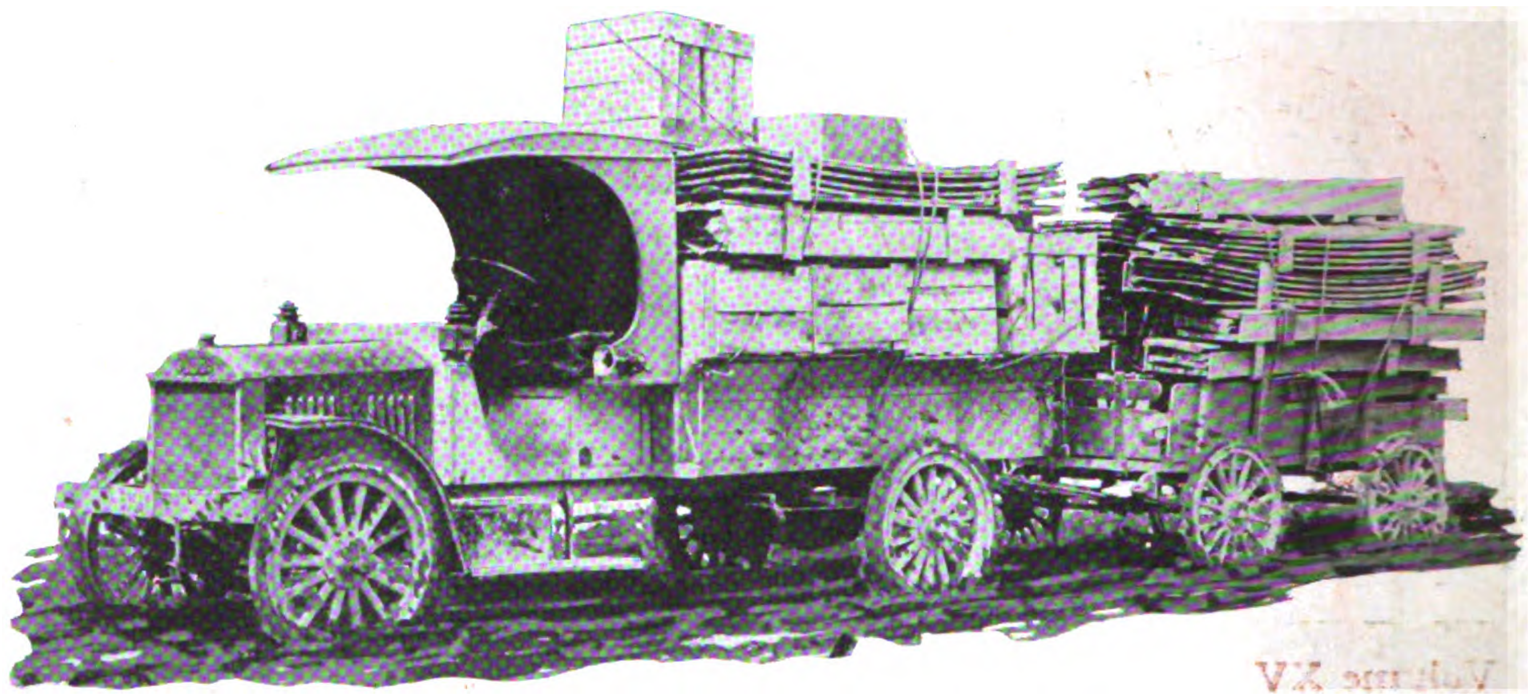
Read What Mr. Porter

Production Engineer of the Globe Motor Truck Co. says about the Master Carbureter:

Northville, Mich., July 8, 1916.
Master Carbureter Corporation,
Detroit, Mich.
Gentlemen:

We wish to say that we have tested out several of the leading carbureters and have never found a carbureter to equal the Master for flexibility, even mixture of gas, easy starting and for use with the poor grade of gasoline we have nowadays. We have also found that it increases power by a large percentage and starts equally well in cold or warm weather. We have been able to make trips through mud and snow with the Master that we absolutely could not make with other carburetens and we know you have a most wonderful carbureter.

Yours very truly,
GLOBE MOTOR TRUCK COMPANY,
G. E. Porter, Production Engineer.



A Remarkable Experiment

This actual photograph shows the finish of a 27 mile haul (Northville, Mich., to Detroit) over hilly and muddy country roads, of a Master Carbureter equipped GLOBE Motor Truck with a trailer, loaded with 3 tons of furniture lumber.

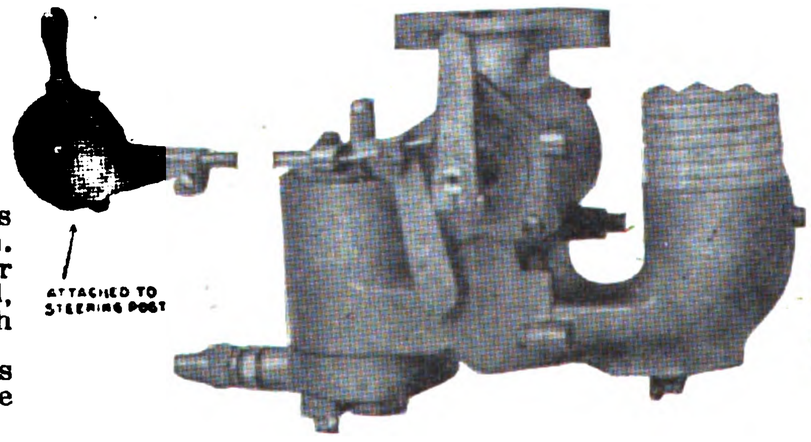
Already Adopted by 23 Truck Manufacturers

The MASTER Carbureter

after exhaustive tests. This improved carbureter is not like any other you have ever seen. It embodies entirely new scientific principles in its design and construction. Write us for more evidence—absolute, convincing PROOF that the MASTER delivers 25 to 40 per cent more MILEAGE per gallon of fuel.

Steering Post Control!

The air damper of the perfected MASTER is opened or closed from the steering column. A touch of the finger gives a rich mixture for easy starting which can be instantly modified, as the motor picks up speed, by another touch on the starting post lever.
In the MASTER there are no springs, cams or dash pots to get out of order—only three moving parts.

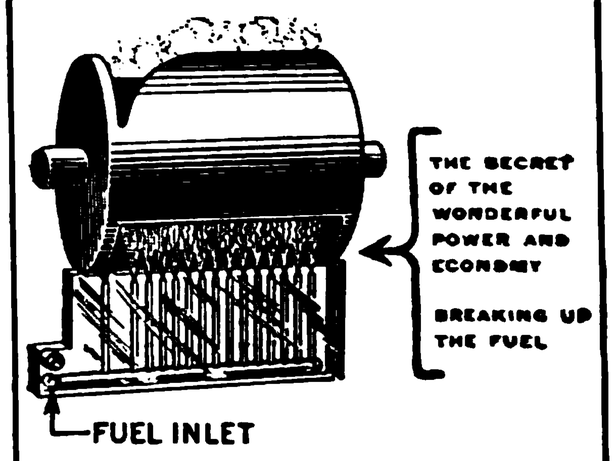


No Adjustments Whatever!

With the steering post control feature of the MASTER the driver never has need or occasion to try to adjust or tamper with the carbureter in any way. Any desired mixture to suit any atmospheric condition is instantly obtained by opening wider or closing the air damper from the steering post.

25% to 40% More Mileage

The MASTER cannot be judged by comparison with any other carbureter. To grasp and to appreciate its remarkable superiority, the new principles in its design, its wonderful "flexibility" and how it develops more power and more mileage with the same quantity of fuel can only be understood when you take this carbureter into your hands, examine it and contrast it with ordinary carbureters.



Study This Picture

The picture above shows the mixing chamber of the MASTER with its multiple feed. The first hole at the left is never covered and furnishes all the fuel required for idling or slow running. As the cylinder revolves the other inlet holes (14 in number in this one-inch size) are uncovered, ONE by ONE, the gas being thus broken up and vaporized many times more thoroughly than in any other carbureter so that the air is absolutely saturated. The number of inlet holes is increased in the larger sizes, the two-inch model having twenty-one inlets.

Master Carbureter Corporation
Dept. 38A
1523 West Fort Street
Detroit, Mich.

You may send me your catalog with free booklet—"Carburetion and Carbureters."

Name .....

Address .....

.....

.....

Truck Manufacturers: Write us today for full particulars. We will gladly ship you a MASTER for personal examination upon request. SEE IT, if only that you may be posted and prepared to meet its competition.

Send This Coupon for Catalog and Valuable New Book Free

"CARBURETION and CARBURETERS"

Whether you are a manufacturer, owner or driver of motor trucks, send your name at once for free copy of valuable new book. It not only explains the scientific principle and describes the process of carburetion, but also shows why the improved MASTER Carbureter is able to accomplish such marvelous results. Send the coupon now—or a postal—to

Master Carbureter Corporation

Dept. 38A

1523 West Fort St., Detroit, Mich.

Pacific Coast Branch: 922-24 S. Los Angeles St., Los Angeles, Calif.

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Truck Opportunity in R. R. Strike—Page 14

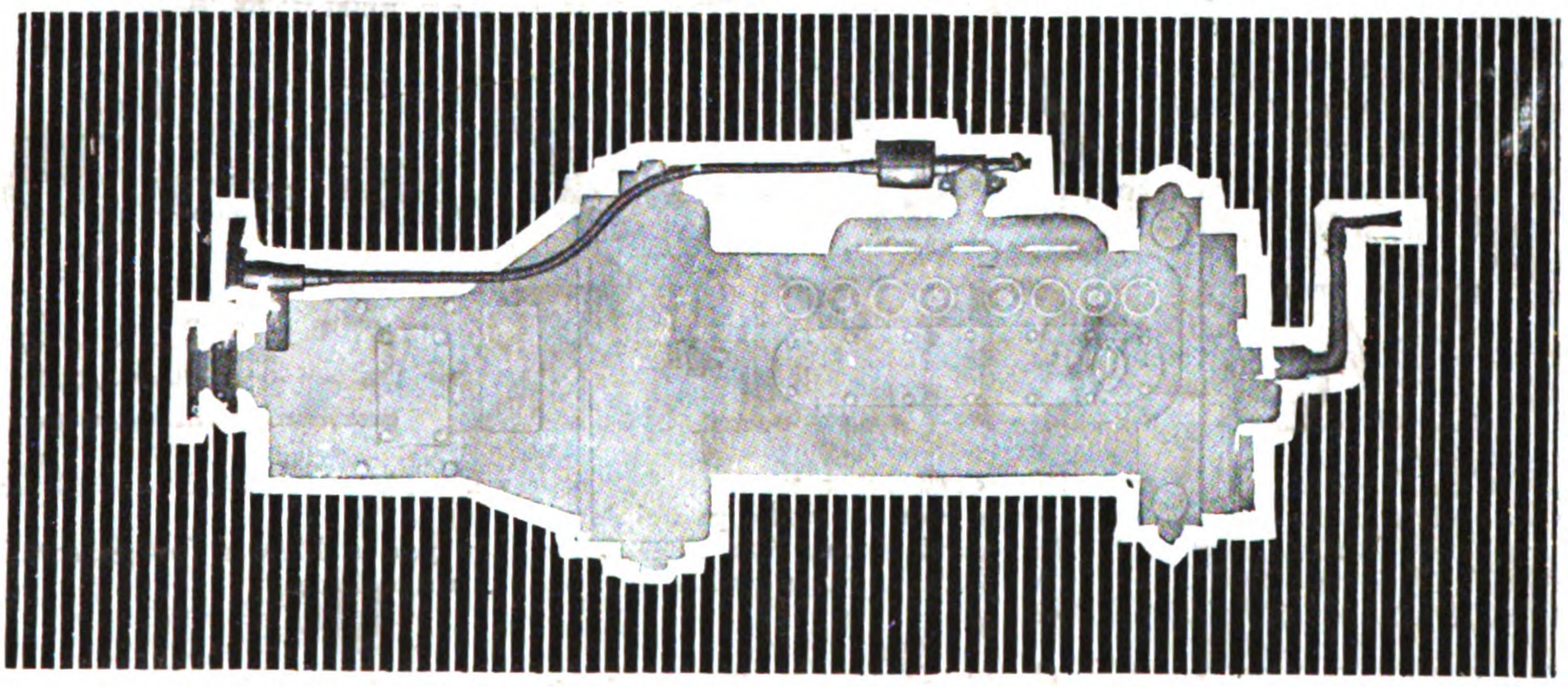
1916

The Commercial Vehicle

Volume XV
Number 3

SEPTEMBER 1, 1916

Twenty Cents a Copy
Two Dollars a Year



ABSOLUTE IN ITS CONTROL THE

PIERCE GOVERNOR

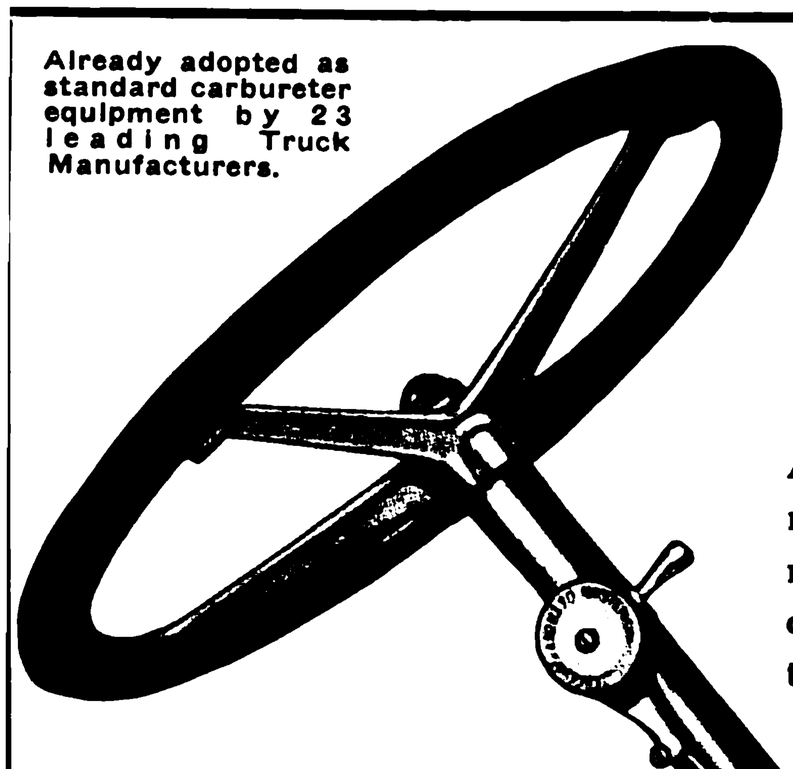
lengthens the life of the vehicle, prevents reckless operation and conserves your truck or delivery wagon investment.

The largest governor builders in the world will gladly tell you *why*.

PIERCE GOVERNOR COMPANY, Anderson, Ind.

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Already adopted as standard carbureter equipment by 23 leading Truck Manufacturers.

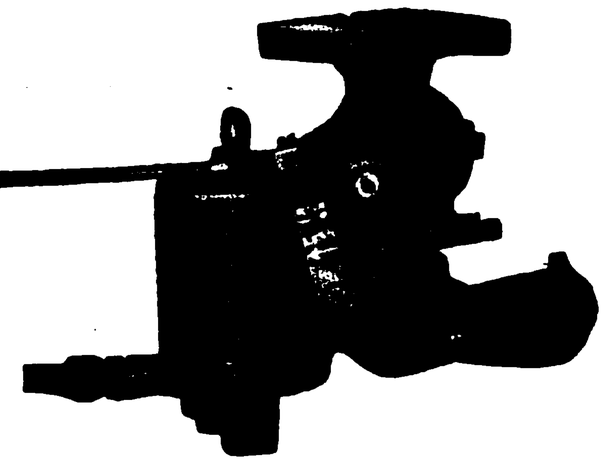


Steering Post Control of Your Mixture

A mere touch of your finger on this steering post lever changes your mixture instantly from rich to lean or medium to meet the requirements of the moment. This steering post control operates the air damper, opening or closing it to admit air in any quantity or proportion desired. Any degree of temperature, any altitude, any climate is instantly accommodated by this improved carbureter with its steering post control. For quick starting and rapid acceleration the Master, with its steering post control, positively has no equal.

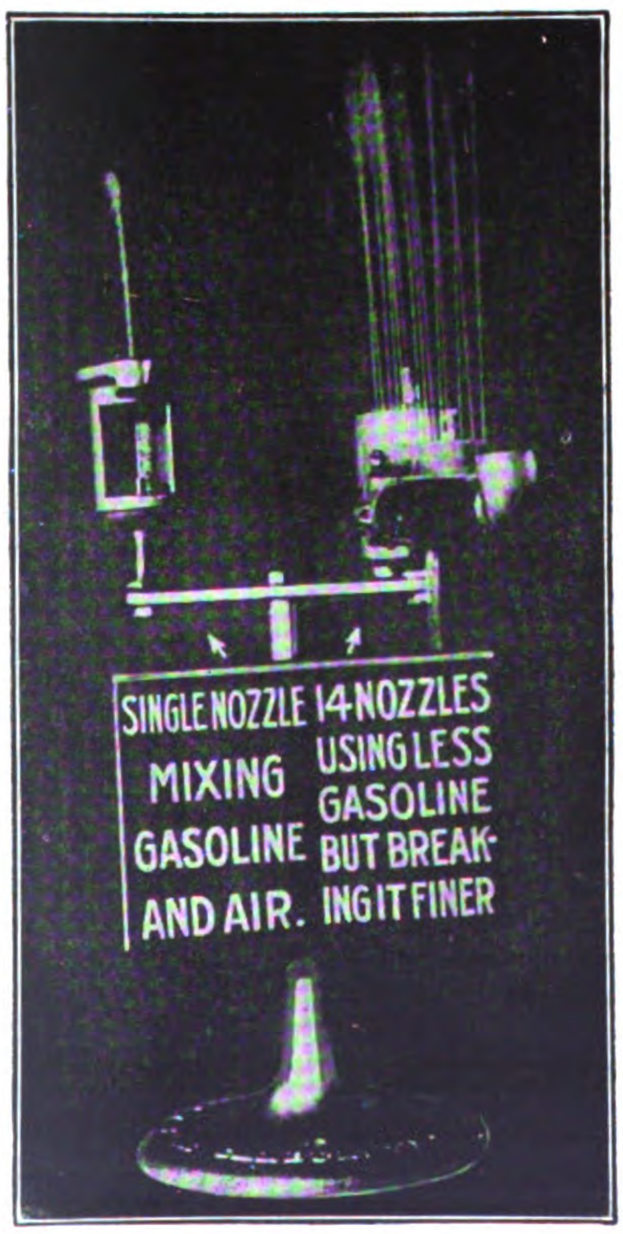
No Adjustments

With absolute control of the mixture from the steering post the driver never has need or occasion to try to adjust or tamper with the carbureter in any way. The Master is trouble proof. No springs, cams or dashpots to get out of order—only three moving parts.



The MASTER Carbureter

Do not try to judge the Master by any other carbureter you ever have seen. This improved carbureter is different, embodying in its construction and design entirely new scientific principles.
Truck Manufacturers: Write us today for full particulars. We will gladly ship you a Master for personal examination upon request. SEE IT, if only that you may be posted and prepared to meet its competition.
Write us for PROOF that the MASTER delivers



25% to 40% MORE MILEAGE

30% More Speed and 30% More Power than ordinary carbureters of single, double or triple "stream" fuel feed. An absolutely new quality of carburetion, a new standard, is attained by this perfected carbureter with its 14 to 21 jet fuel distributer that pulverizes and destroys the tiniest particle of liquid gas, transforming it into the thinnest mist. Contrasted with ordinary carbureters the result is the difference between aerated gasoline and thoroughly saturated air—perfect vaporization, even with low grade fuels.

Carbureter "Trouble Book" Sent Free
Mail This Coupon Now

Whether you are a manufacturer, owner or driver of motor trucks, you should have this interesting new book, which we will send free with our compliments if you will fill out and mail the coupon or a postal today. Written by Mr. R. M. Anderson, America's foremost carburetion engineer. This book gives valuable and helpful information on carbureters and their adjustment, together with a clear and complete explanation of the scientific principle of carburetion and full description of the improved MASTER. Send for your copy now.

Master Carbureter Corporation
1521 West Fort St., Detroit, Mich.
Pacific Coast Branch:
922-24 S. Los Angeles St., Los Angeles, California

Master Carbureter Corporation,
1521 W. Fort St.,
Detroit, Mich.

Without any obligations on my part you may send me free and postpaid a copy of the Carbureter "Trouble Book."

Name.....

Address.....

.....

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19 1916

The Commercial Vehicle

Volume XV
Number 4

SEPTEMBER 15, 1916

Twenty Cents a Copy
Two Dollars a Year

Listen! Listen to the clatter of the chain-drive truck. Remember that noisy machinery means power wasted—*power misapplied.* Decide then that your next truck shall be the *silent,* chainless Packard—smooth-running as a touring car on pneumatic tires. Let our experts size up your problems. Write Detroit.

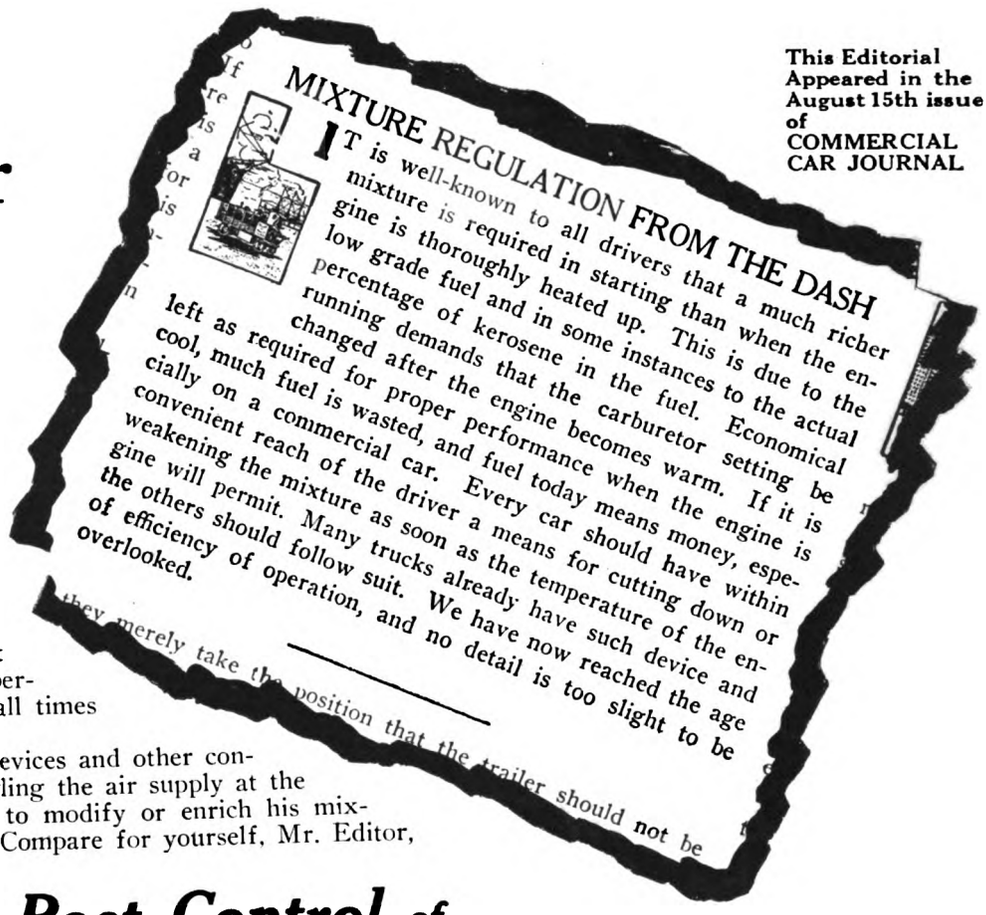
Ask the man who owns one

Packard
CHAINLESS
TRUCKS

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Setting Mr. Editor Right

This Editorial Appeared in the August 15th issue of COMMERCIAL CAR JOURNAL

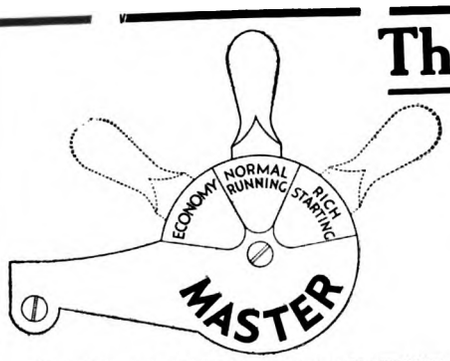


Dear Mr. Editor:

We commend your efforts to be of genuine and helpful service to your readers, but we believe many of them would have read with interest another paragraph telling them about the new STEERING POST CONTROL of the MASTER CARBURETER that gives to the driver absolute and perfect mastery of his mixture at all times and under all conditions.

As you know, the dashboard devices and other contrivances for choking and strangling the air supply at the intake do not enable the driver to modify or enrich his mixture at will to any exact degree. Compare for yourself, Mr. Editor,

The Steering Post Control of The MASTER Carbureter



and you will quickly understand why more than twenty-three leading truck manufacturers have recently adopted it as standard equipment after THEY compared it and tested it.

Notice the picture at the left. This little lever is attached to the steering post and connected directly to the air damper which it operates. With a touch of his finger, the man at the wheel can change his mixture, on the instant, to rarefy or enrich it to the exact degree required for quick starting, even with a cold motor, or to suit any condition of weather or altitude. With the MASTER the driver NEVER has need or occasion to tinker or tamper with his carburetor.

No Adjustments

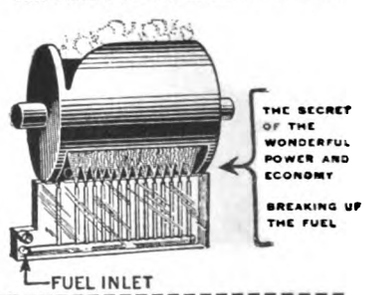
No priming is ever necessary. There are no springs, no cams or dash-pots to get out of order. The MASTER is both fool-proof and trouble-proof.

The picture at the right shows the MASTER'S perfected fuel distributer, with its 14 to 21 jets—according to size. This feature is responsible for its showing, under a hundred tests, of

25% to 40% MORE MILEAGE

30% MORE POWER and 30% MORE SPEED

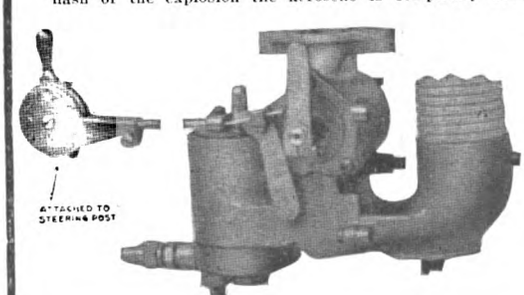
than is obtainable from automatic type carbureters.



It is hardly necessary for us to explain to you, Mr. Editor, how much more thoroughly this MANY jet distributer breaks up the fuel, crushing and shattering the tiniest particles so that every atom of power is extracted from the "gas" and delivered to the motor. High-grade and low-grade fuels look alike to the MASTER. The kerosene component in the cheaper grades is pulverized as thoroughly as the lighter gasoline element and, in the flash of the explosion the kerosene is completely burned and consumed without leaving a trace of carbon.

We don't ask you or any other reader of this letter to accept our claims. We will gladly ship to any truck manufacturer or truck owner a MASTER for examination and actual test. No obligations of course.

Cordially yours,
MASTER CARBURETER CORPORATION,
Arthur N. Jelley, Secretary.



FREE Send this coupon for free copy of our valuable CARBURETER TROUBLE BOOK; also Master Catalog.

MASTER CARBURETER CORPORATION
1521A West Fort St., Detroit, Mich.
Pacific Coast Branch: Los Angeles, Calif. 922-24 S. Los Angeles St.

Master Carbureter Corporation,
1521A West Fort St.,
Detroit, Mich.

You may send me, free and postpaid, your CARBURETER TROUBLE BOOK. Also the MASTER Catalog.

Name .....

Street .....

City .....State .....

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The Commercial Vehicle

Volume XV
Number 5

OCTOBER 1, 1916

Twenty Cents a Copy
Two Dollars a Year

SPEED CONTROL

MANUFACTURERS or owners of commercial vehicles of any kind whatsoever, can not afford to ignore the problem of providing an automatic means for controlling the speed.

A thoroughly reliable governor will conserve the owners' investment and save many dollars in cost of upkeep, by making speeding impossible. For this reason practically all the prominent engine builders and truck manufacturers recommend and use



PIERCE GOVERNORS

PIERCE GOVERNOR COMPANY

World's Largest Governor Builders

ANDERSON, IND.

EARLE & BOGGS
1790 Broadway, New York City
Eastern Representatives

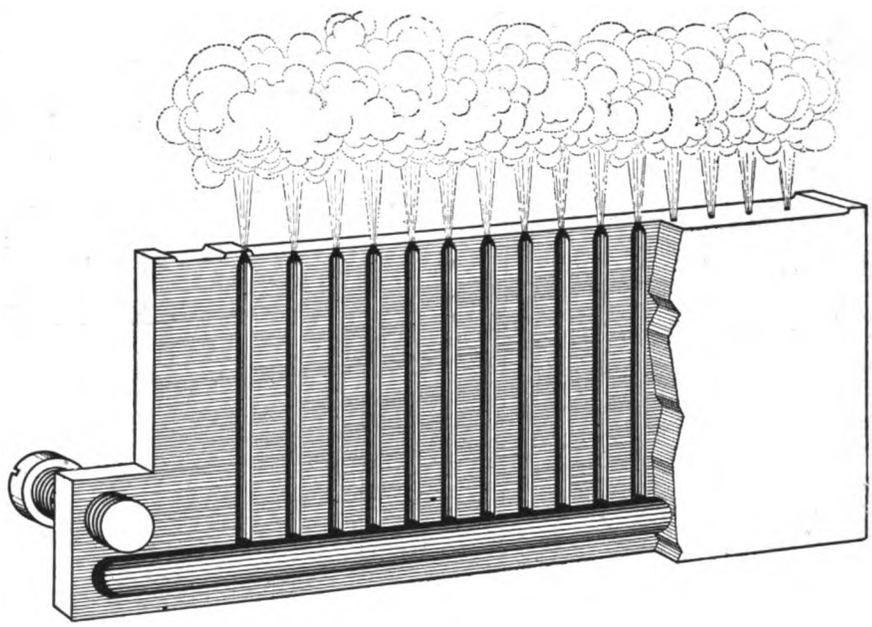
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14 Jets Instead of 3

The Secret of the Wonderful Efficiency and Economy of

THE MASTER CARBURETER

COMPARE this new scientific principle of mechanical control and operation with automatic carbureters with their single, double or triple stream-like sprays. In this perfected carbureter the fuel supply enters the mixing chamber in fourteen needle point sprays (21 in the largest size), as shown in this picture. Each of these 14 to 21 tiny jets occupies a different position in the path of the inrushing air so that its smallest atoms are thoroughly broken up and pulverized, producing a perfect mixture. There is no loss—no waste of power—and no carbonizing of the kerosene component found in all low-grade fuels. All grades of fuel, all weathers, all altitudes and all climates look alike to the MASTER with its wonderful



The George C. Hale Co.

Kansas City, Mo., Aug. 27, 1916.

Master Carbureter Corporation, Detroit, Mich.

Gentlemen:

Referring to your "Master Carbureters" I am pleased to advise you that we have installed these on Motor Fire Apparatus of our manufacture which is in service in the Kansas City Fire Department, and result has been very pleasing, to both ourselves and the officials of this department.

We have also equipped "Hale" motor fire apparatus for several other cities with the "Master" and have never had one word of complaint or objection.

Recently, I equipped my private car with a "Master" and have obtained more power by its use and more mileage per gallon of gasoline as well.

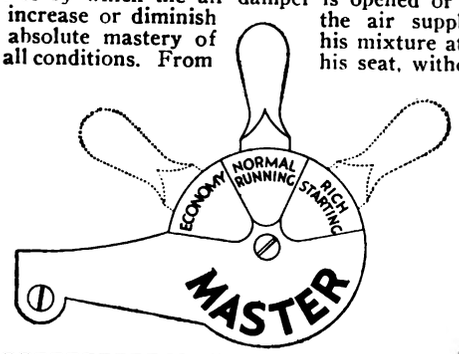
With best wishes for your success, I am,

Very truly yours,
GEORGE C. HALE,
Pres.

No Adjustments!

Steering Post Control

No priming—nothing to tamper with or get out of order. No springs to lose their tension, no cams or dash-pots. No butterfly valve. The Master is trouble-proof. The Steering Post Control by which the air damper is opened or closed to measure—increase or diminish the air supply—gives the driver absolute mastery of his mixture at all times and under all conditions. From his seat, without raising the hood, he can enrich or rarefy his mixture at will, and instantly, to meet any condition of the weather or atmosphere or for quick starting with a cold motor. Twenty-three leading manufacturers have adopted the Master as standard equipment after the most exhaustive and convincing tests.



25 to 40% MORE MILEAGE

30% More Power—30% More Speed

Ask us to show you. Let us send you positive proof that the Master actually delivers 25 to 40% more mileage—30% more power—30% more speed on the same fuel allowance. Whether you are a manufacturer, owner or driver of power trucks, you owe it to yourself to investigate. Post yourself on this Carbureter that is DIFFERENT. Learn why it is replacing other carbureters of every other make on thousands of trucks in all parts of the country. But do not try to understand the mechanical MASTER by what you know about ordinary "automatic" carbureters. To grasp the difference you simply must see and examine the MASTER for yourself. Let us ship you one for free examination and for any test you may wish to give it. Write us today.

MASTER CARBURETER CORPORATION

Dept. 310. 1523 Fort Street, W., Detroit, Mich.

Pacific Coast Branch: 922-24 S. Los Angeles Street, Los Angeles, Calif.

MASTER CARBURETER CORPORATION
Dept. 310. 1523 Fort Street W. Detroit, Mich.

Without any obligations on my part you may send me, free and postpaid, a copy of the "Carbureter Trouble Book" and your new Master Catalog.

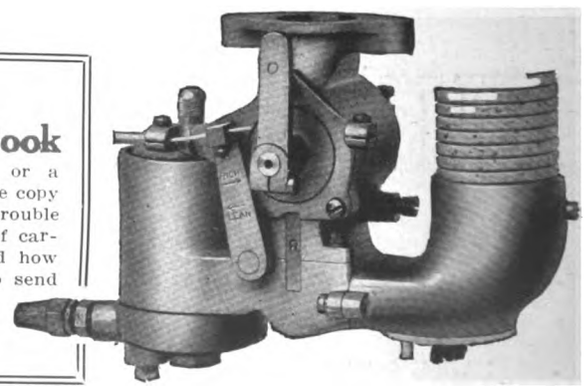
Name.....

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The Carbureter Trouble Book

FREE Send this coupon, or a postal, today for free copy of the Carbureter Trouble Book. Explains all the causes of carbureter and engine troubles and how to discover them. We will also send you our new MASTER Catalog—just out—describing the final perfect carbureter.



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The Commercial Vehicle

Volume XV
Number 6

OCTOBER 15, 1916

Twenty Cents a Copy
Two Dollars a Year

More! More Packards have been purchased for U. S. Army service than any other truck

Over $2,250,000 worth of chainless Packards bought in six months—that's the outcome of the Government's critical study and tests of motor trucks on the Mexican border.

Handling a grave emergency with keen business sense, the Army seized the chance to make decisive trials of motor hauling under campaign conditions.

Hard-driven—over-loaded—plowing along in sand and mud—the silent, worm-drive Packards proved equal to every demand.

Their power, economy and freedom from road troubles won them the hardest jobs—won also the Army's confidence and approval.

The first Government order was for 27—the fifth for 330.

In all, re-orders now total 3,650%. *The largest number of motor trucks of any one make bought for U. S. Army use are dust-proof, chainless Packards.*

Let us show you how to standardize *your* hauling and enlarge the operating zone of your business. Why not telephone our local dealer now?

Ask the man who owns one

Packard
CHAINLESS
TRUCKS

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No Service Ever Required

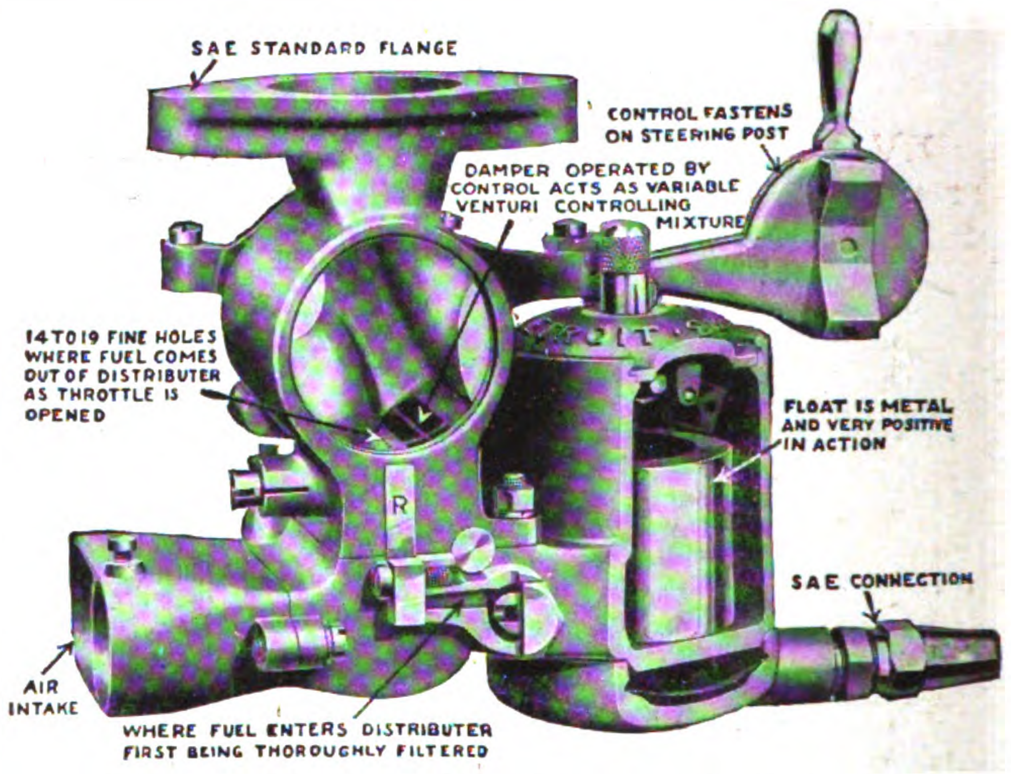
No Adjustments

No Costly Delays for the Driver
No Annoyance for the Dealer
Maximum Economy for the Owner
More Sales for Truck Manufacturers
and every dollar in our treasury stands back of this guarantee.

All this and more the perfected, trouble-proof Master Carbureter makes possible. Ordinary carbureters that must be adjusted for every changing condition of the weather, for every altitude and climate, quickly multiply their original cost in delays and expense for adjustments.

Thousands of trucks of every make all over the United States are making wonderful new records for economy and efficiency since being equipped with Master Carbureters in place of the "automatic" carbureters formerly used on them. Write us for proof—actual figures.

The Master Truck owner needs no service—no assistance from the dealer to keep his carbureter at its highest efficiency—for the Master has no adjustments, which is only one more reason why truck manufacturers, dealers, owners and drivers are seizing upon the new Master. Already 23 leading manufacturers have adopted the MASTER as standard equipment. Don't you want to know why? Let us send you full information. Write us today.



Section View of the Master Carbureter

The MASTER Carbureter

An absolutely new quality of carburetion, a new standard, is attained by this perfected carbureter with its 14 to 21 jet fuel distributer that pulverizes and destroys the tiniest particle of liquid gas, transforming it into the thinnest mist. Contrasted with ordinary carbureters the result is the difference between aerated gasoline and thoroughly saturated air—perfect vaporization, even with low grade fuels.

Steering Post Control Regulates Your Mixture

A mere touch of your fingef on this steering post lever changes your mixture instantly from rich to lean or medium to meet the requirements of the moment. This steering post control operates the air damper, opening or closing it to admit air in any quantity or proportion desired. Any degree of temperature, any altitude, any climate is instantly accommodated by this improved carbureter with its steering post control. For quick starting and rapid acceleration the Master, with its steering post control, positively has no equal.

The Master steering post control should not be confounded with ordinary dashboard devices or steering post contrivances designed for the sole purpose of priming and choking—a makeshift method of facilitating starting.

In the Master the air supply is not choked at the intake but is constricted by the damper at the outlet, like a variable venturi. When pulled to "rich" position the venturi (or opening) paralleling the row of 14 (to 21) jets is very small and the pure gas rushes to the motor under tremendous suction, thus enriching the mixture so that quick starting, even with a cold motor, is easy and certain. But the advantage of the Master method only begins with this feature. For as the motor picks up speed, the mixture may be modified to any texture required.

The Master steering post control is not a push and pull choke but is graduated, like the spark lever, to rarify or enrich the mixture to any exact degree desired by admitting any quantity of air desired. It is therefore very much more simple than any push and pull choke and very much more flexible, requiring none of the pushing and pulling, fumbling and juggling demanded by the usual dashboard devices, which often either load and kill the motor or starve it to a spitting and sputtering condition. In these exclusive features of improved design lies the secret of the Master's showing of

25 to 40% MORE MILEAGE
30% MORE POWER
30% MORE SPEED

Send Coupon for Valuable Book Free

Send your name and address, on the coupon or postal, for "The Carbureter Trouble Book" sent free. We will also send you our new Master catalog just published. Do it now.

Master Carbureter Corporation
Dept. 310B, 1310B, West Fort St. DETROIT, MICH.
Pacific Coast Branch
922 So. Los Angeles St., Los Angeles, Cal

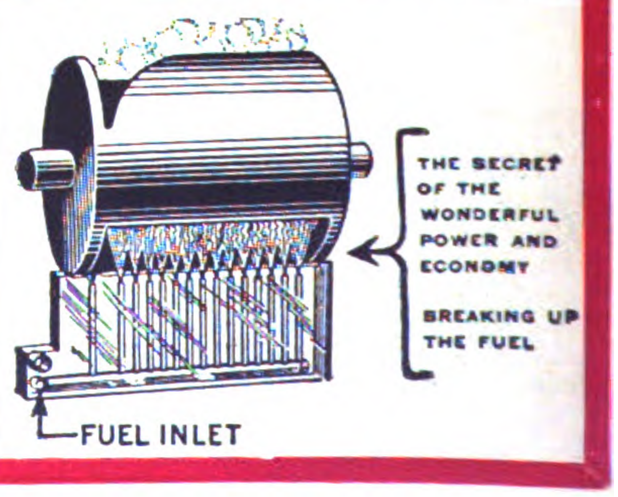
MASTER CARBURETER CORPORATION,
Dept. 310B, 1310B, West Fort St.,
Detroit, Mich.

Without any obligation on my part, you may send me free and postpaid a copy of the Carbureter "Trouble Book."

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City.....State .....



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Annual Forecast Issue

D
NOV 3 '16

The Commercial Vehicle

Volume XV
Number 7

NOVEMBER 1, 1916

Twenty Cents a Copy
Two Dollars a Year

STUDEBAKER

Commercial Cars



A company known the world over for the high quality of its products equips its commercial cars with PIERCE GOVERNORS

Why?

Because they know that highest efficiency can not be attained unless the vehicle speed is automatically controlled, and—

PIERCE GOVERNORS

are the only Governors that come up to their Standard of Quality and Performance

Pierce Governor Co.

World's largest Governor Builders
Anderson, Indiana

EARLE & BOGGS
1790 Broadway, N. Y. City
Eastern Representatives

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This Master Carbureter Equipped Motor Car Climbs Several Times Daily

From Midsummer Valleys to Frozen Mountain Peaks

THE ARGENTINE & GRAY'S PEAK RY. CO.
Denver, Colo.

Master Carbureter Corporation,
Detroit, Mich.

Gentlemen:

In reply to your inquiry of July 5th, as to our experience with Master Carbureter on our railway motor car, we take pleasure in testifying to its merits.

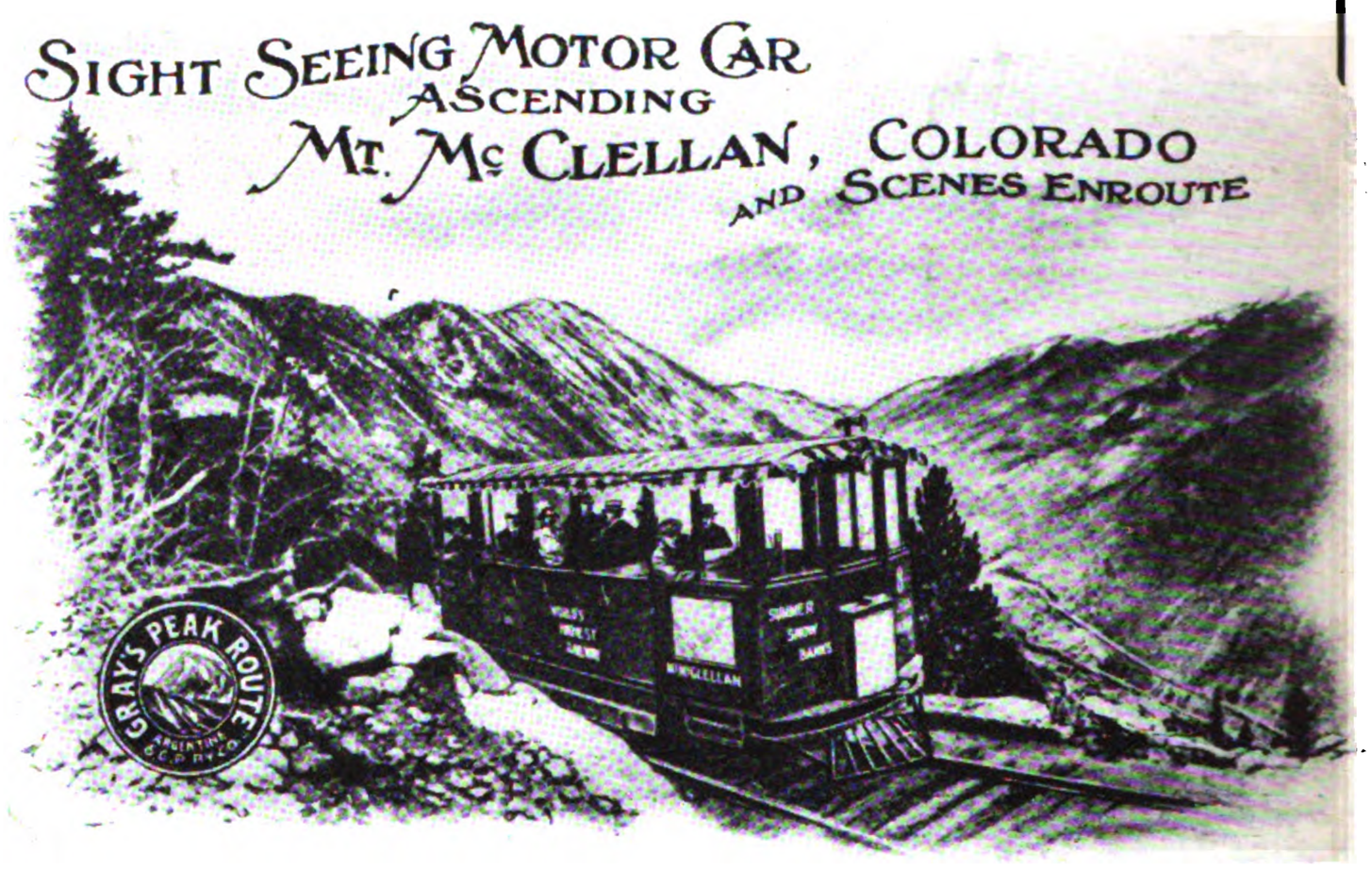
Our car weighs, loaded, slightly over 20,000 lbs., and we climb grades as high as 10%. Our road starts at about 9200 feet altitude above sea level, and reaches a point above 14,000 in a distance of approximately 14 miles. We carry 35 passengers and make this trip in from one hour and a quarter to one hour and a half each way.

(Only the Master Can Do It)

We tried two standard make carbureters on this car, and had great difficulty in getting any kind of service over the great altitude and temperature variations experienced. Since putting on the Master we have *more than cut our gasoline consumption in half*, and have not the slightest difficulty in getting proper carburetion under any and all conditions of atmosphere and altitude, as we can compensate instantly for any variations encountered.

We are now building another car along the same lines and will not consider anything but a Master for its equipment. *We are through experimenting.*

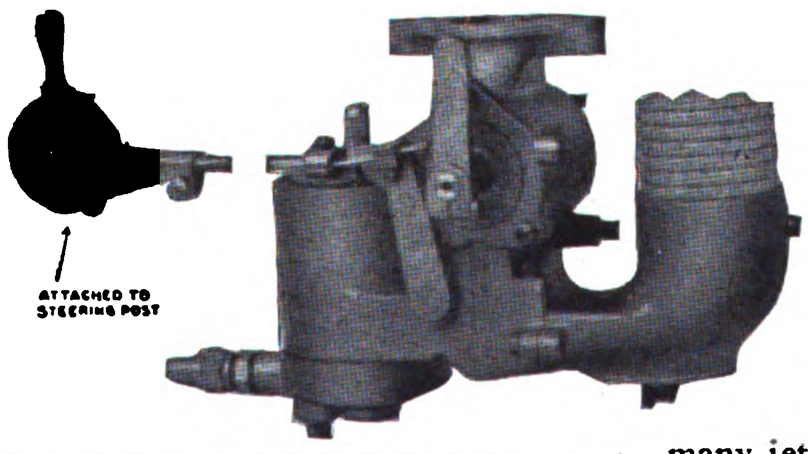
Yours very truly,
H. B. BARNES,
Chief Engineer, A. & G. P. Ry. Co.



For Your Trucks, for All Weathers

THE MASTER CARBURETER

Let us prove to you now why the MASTER Carbureter will give you the best results. Write us today—send the coupon—for full information about this wonderful carbureter that defies all climates, all altitudes and all weathers. On thousands of trucks of every size and make the MASTER has put an end to all carbureter troubles and worries. Let us convince YOU that this new type mechanical carbureter is actually trouble proof. Arrange with us for a test of the MASTER at our risk on your truck, and you, too, will be through with experimenting.



No Adjustments!

Through the Steering Post Control feature of the MASTER, the air damper can be opened or closed from the driver's seat. Any desired mixture to suit any condition of weather or speed can be obtained simply by a touch of the finger on the steering post lever. There is never any occasion for the driver to touch the carbureter itself. In the MASTER there are no springs, cams or dash pots to get out of order—there are only three moving parts. The unique, many-jet fuel feed of the MASTER Carbureter is responsible for the wonderful saving in gasoline such as instanced by the above letter. Actual tests made by a leading truck manufacturer show 50% more mileage. MASTER Carbureters are standard equipment for many of the foremost makes of trucks.

Master Carbureter Corporation,
1311 West Fort Street,
Detroit, Mich.

You may send me your new MASTER catalog with free booklet—"Carburetion and Carbureters."

Name .....

Address .....

.....

NOW is the time to get our new catalog with valuable treatise on "Carburetion and Carbureters," by R. M. Anderson, the recognized authority on the subject. Simply mail us the coupon today—or a postal—and we will send you this free book with explanation and proof of the MASTER'S actual performance on all kinds of vehicles under all conditions. An investigation of the MASTER means money saved on fuel.

MASTER CARBURETER CORPORATION

1311 WEST FORT STREET — DETROIT, MICH.

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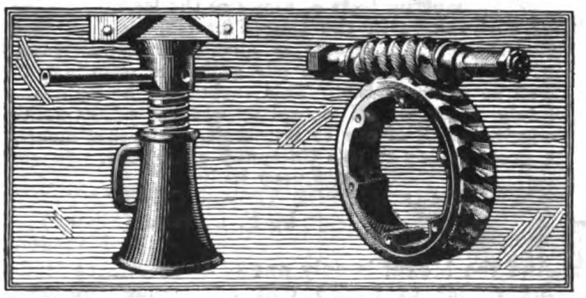
NOV 20 '16

The Commercial Vehicle

Volume XV
Number 8

NOVEMBER 15, 1916

Twenty Cents a Copy
Two Dollars a Year



Muscle power accomplishes its *utmost* when it makes use of the worm-drive principle—and so does *motor power*

Several hundred times his weight a man can lift with a little hand-screw—a jack.

Applying the same sort of leverage, the worm-drive of a Packard motor truck makes the utmost use of the great power its engine develops.

It takes hold without slip or jerk or lost motion. It works silently—in a bath of clean oil. It gives more miles and tonnage per gallon of gasoline because it turns more of the motor's power into *transportation.* It keeps on economizing because it is practically wear-proof and fool-proof.

Seven worm-drive Packard models—1 to 6½ tons—the one *best* truck for every hauling service. Write Detroit.

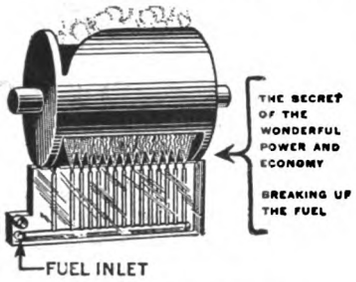
Ask the man who owns one

Packard
CHAINLESS
TRUCKS

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MASTER
CARBURETER

Now Furnished as Standard Equipment on
MOGUL TRUCKS



The MASTER'S 14 to 21 Jet Distributer

The Master cuts the cost of fuel and at the same time gives greater power. It is built on a wonderful, new principle of many jet gasoline feed. The gas is drawn through as many as 21 fine nozzles in small sprays that transform it into the thinnest mist. The tiniest particles of liquid gas are completely broken up. The result is perfect vaporization, an even mixture in which the air is thoroughly saturated and gives the most efficient combustion. Every bit of gas is transformed into power. This principle absolutely eliminates the waste caused by uneven mixture.

No Adjustments—Trouble-Proof

The Master Carbureter frees the user from the greatest of carbureter troubles—it does away with all adjustments under the hood. Nothing to get out of order—no springs, cams or dashpots—only three moving parts.

For Low Grade Fuels

The efficiency of the Master is proved conclusively by its performance on low grade fuels. It gives complete vaporization because it "grinds up the fuel." There is no carbonizing of the kerosene component found in all low-grade fuels. The fuel distributer cannot become clogged. The dirt trap and tube screen provide positive protection.

One Jet at a Time

The fuel and air are proportioned mechanically by a rotary throttle. When the throttle is closed for idling or slow running, only one fuel hole is uncovered. As the throttle is opened, additional fuel holes are uncovered one by one and the fuel supply increased. No more gas than is necessary is used.

Send this COUPON for FREE Booklet

MASTER CARBURETER CORPORATION,
1311A West Fort St.,
Detroit, Mich.

Without any obligation on my part, you may send me free and postpaid, a copy of the Carbureter "Trouble Book."

Name .....
Address .....
City .....
State .....

MOGUL MOTOR TRUCK COMPANY
Makers of
MOTOR VEHICLES
4125 Forest Park Boulevard
St. Louis, U. S. A.

10/18/16.

Master Carbureter Corporation,
Detroit, Mich.

Gentlemen:

After making tests of many of the leading makes of carbureters in the United States, we find that the Master Carbureter is absolutely satisfactory, giving us more mileage per gallon of gasoline, as well as more power. This carbureter being absolutely clear of all complications or adjustments eliminates all of our carbureter trouble, and means a great saving to this Company each year.

Yours very truly,
MOGUL MOTOR TRUCK COMPANY
by F. Dawson (Signed)
Manager.

And the Mogul is only one of **twenty-three leading makes of trucks** that now come equipped with Master Carbureters. Why? Because in actual competitive tests the Master delivers **more mileage, more power** and **more speed** than carbureters of ordinary design.

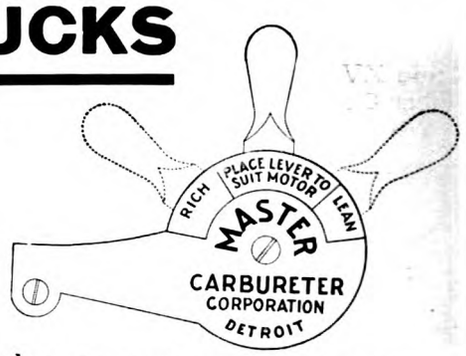
The results shown by the Master Carbureter on Mogul Trucks can be **proved** on **your** trucks, **no matter what size or make**. Will you give us a chance to prove it? Write us today.

MASTER CARBURETER CORPORATION
1311A West Fort St. Detroit, Mich.

Pacific Coast Branch
922 So. Los Angeles St.,
Los Angeles, Cal.



Master equipped 1½ ton Mogul Truck



Steering Post Control of the MASTER

The Master Carbureter requires no adjustments—there is never any occasion for the driver to lift the hood. It is absolutely controlled from the seat by the steering post lever. A mere touch of the finger changes your mixture instantly from rich to lean or medium, to meet the requirements of the moment. This steering post control operates the air damper, opening or closing it to admit air in any quantity or proportion desired. Any degree of temperature, any altitude, any climate is instantly accommodated by this improved carbureter with its steering post control. For quick starting and rapid acceleration the Master positively has no equal.

Graduated Control of the Mixture

The Master steering post control is not a push and pull choke but is graduated, like the spark lever, or rarefy or enrich the mixture to any exact degree desired by admitting any quantity of air.

The Master for All Trucks

Write us today for full particulars. Let us submit actual proof that the Master delivers *25% to 40% More Mileage, 30% More Power and 30% More Speed.* Let us give you the results of tests made by Truck Manufacturers under all conditions.

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Teamwork Wins in Parcel Delivery

DEC 6 1916

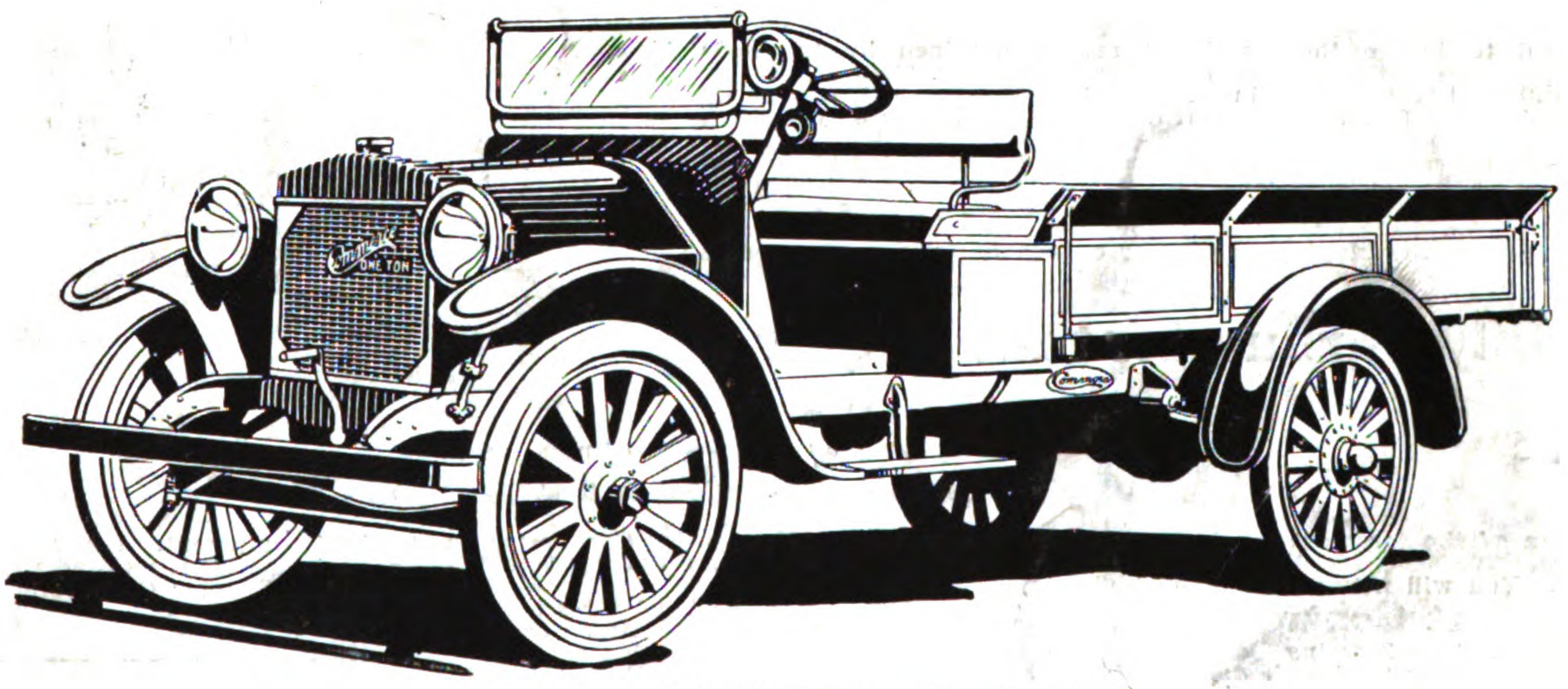
The COMMERCIAL VEHICLE

Volume XV
Number 9

DECEMBER 1, 1916

Twenty Cents a Copy
Two Dollars a Year

Another Pierce Victory



Commerce Model "EA" One Ton Truck

AFTER extensive competitive tests, The Commerce Motor Car Company, Detroit, Mich., has adopted Pierce Governors as standard equipment on their trucks.

Why?

Because they knew that a reliable governor would assist the purchaser in getting better service from the entire equipment, and because a thorough trial demonstrated that Pierce Governors operate perfectly under the most trying conditions.

You'll find Pierce Governors on all the best trucks.

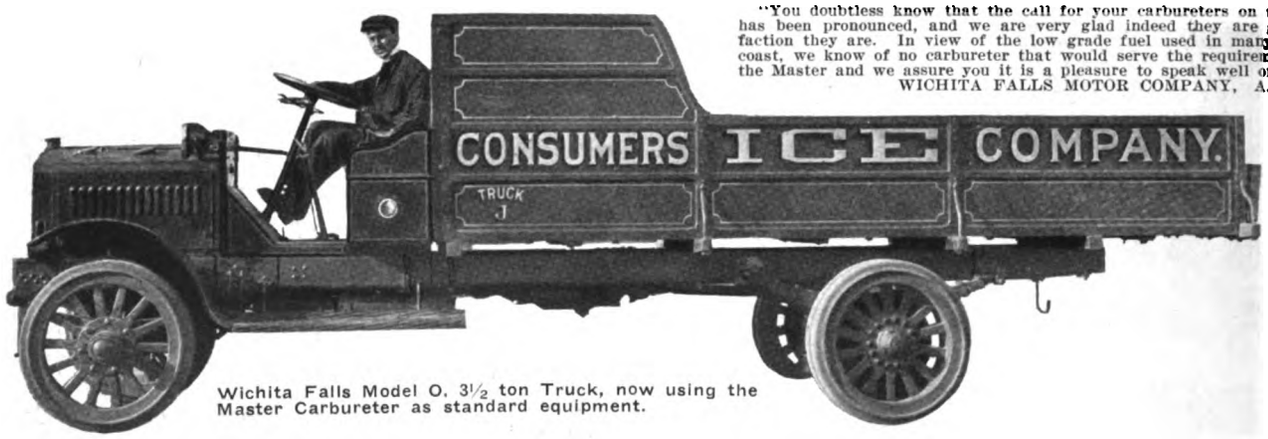
PIERCE GOVERNOR COMPANY

World's Largest Governor Builders

ANDERSON, INDIANA, U. S. A.

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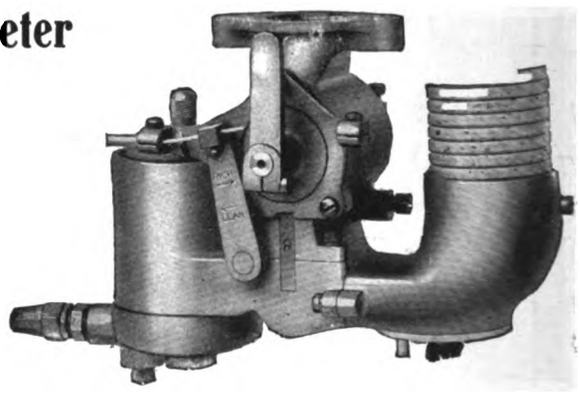
"You doubtless know that the call for your carbureters on the Pacific Coast has been pronounced, and we are very glad indeed they are giving the satisfaction they are. In view of the low grade fuel used in many sections of the coast, we know of no carbureter that would serve the requirements better than the Master and we assure you it is a pleasure to speak well of it."
WICHITA FALLS MOTOR COMPANY, A. R. Grundelle.



Wichita Falls Model O, 3½ ton Truck, now using the Master Carbureter as standard equipment.

Try It on *YOUR* Truck at Our Risk

The MASTER Carbureter



No matter what kind or size of truck you build, own or drive, you simply cannot afford to ignore the wonderful results obtained by hundreds of truck owners from the improved Master Carbureter. This carbureter is entirely different from any carbureter you have ever seen. Let us send you one for 30 days' free trial. Try it out under conditions of your own choosing. Put it to the severest tests—for economy, for flexibility and adaptability to all conditions of weather and temperature, for hill climbing, for rough roads, for quick starting with a cold motor. If the Master fails to deliver **more power** and **more mileage** on **less gasoline** than you have ever received from any other carbureter, return it to us at our expense. We offer the Master Carbureter on the basis of **demonstrated performance.**

The Only Carbureter that Requires

No Adjustments

Twenty-three of the foremost truck manufacturers now specify the Master Carbureter as standard equipment. Why? Because, by actual competitive tests on their own trucks, the Master gives **30% more power, 25 to 40% more mileage.** Let us send you the **facts** and figures. You will never realize the highest efficiency from your trucks until you have installed a Master Carbureter.

Steering Post Control. It is never necessary to raise the hood for adjustments to any change in weather, altitude or road conditions. The Steering Post lever gives the driver, without leaving his seat, a graduated control over the air damper—a touch of the finger instantly modifies the mixture to any texture desired. The Master eliminates adjustments under the hood—costly "tinkering" by unskilled drivers.

At this time of year especially the Master demonstrates its supremacy for quick starting with a cold motor. Trouble-proof—so simple and durable in construction that it can't get out of order. Only three moving parts, and they are wearproof.

14 Jets instead of 3. That's the secret of the extraordinary fuel economy. Instead of the ordinary fuel feed of 1 to 3 sprays, the Master has 14 to 21 sprays (according to size). Each spray delivers a gaseous mist, so thoroughly vaporized that the mixture gives perfect and powerful combustion. Even low grade fuels are ground up to velvet-like smoothness, converting every particle of gas into power without carbonizing of the kerosene element.

For idling or slow running only one fuel jet is uncovered. As the Rotary Throttle revolves more jets are uncovered, **one by one**—as many as are required. Fuel consumption is economized with scientific accuracy.

Convince Yourself
Mail this Coupon NOW

Tear off and mail this coupon for more information about the Master Carbureter, and free copy of valuable booklet, "Carburetion and Carbureters." With the rapidly increasing use of the Master Carbureter, every truck manufacturer, owner and driver will be obliged to decide for or against it. Why not make your decision now—if only to keep posted on developments among other truck makers and owners?

Master Carbureter Corporation
1312 West Fort St., Detroit, Mich.
Pacific Coast Branch
922-24 S. Los Angeles St., Los Angeles, Cal.

Master Carbureter Corporation,
1312 West Fort Street,
Detroit, Mich.

You may send me, without any obligation on my part, your catalog with free booklet—"Carburetion and Carbureters."

Name.....
Address.....
Town.....
State.....

Choice of Leading Cities for Fire Dept. Apparatus

"Your carbureter is the one for this department. It is the nearest approach to being fool-proof of any I have ever seen. It is simply wonderful for quick starting, for surplus power and speed and for economy."—Daniel A. Sullivan, Automobile Instructor, Fire Dept. of the City of New York.

"I have tried out one of the Master Carbureters on one of our high-powered cars built here in our shops. The Master simply spells perfection when it comes to carbureters.
"My car will certainly be equipped with 'Master' and you can figure on an order for ten without further investigation."—A. L. Weeks, Chief Fire Department, City of Spokane, Wash.

"Last spring I installed a Master Carbureter on car used by me, and after giving it a thorough tryout, we equipped ten (10) pieces of fire apparatus with Master Carbureters, which are giving perfect satisfaction."—John F. Healy, Chief of Fire Department, Denver, Colo.

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DEC 19 1916

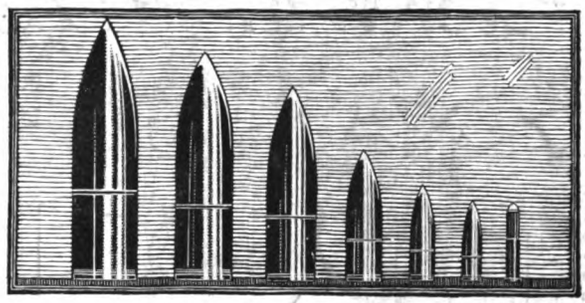
Tax Compromise or Fight

The Commercial Vehicle

Volume XV
Number 10

DECEMBER 15, 1916

Twenty Cents a Copy
Two Dollars a Year



Seven sizes! The right ammunition —*the right motor truck*—are important factors in the winning of campaigns

It's range—and speed—and carrying power—that win "the great drives" in battles for business.

Your hauling may require burly six-tonners of great capacity—or a battery of nimble, far-reaching one-ton units. On your selection depends your fighting efficiency.

Seven sizes Packard offers—seven sturdy models—one to six and one-half tons—with bodies for all purposes.

There is a Packard truck for your every trucking need—a full line to standardize on—obviating a troublesome "mixture of cars."

Make sure of the right truck—in quality—in size—in price. Consult any branch—or Detroit.

Ask the man who owns one

Packard
CHAINLESS
TRUCKS

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For the Sake of Economy—
Specify MASTER Carbureter
on Your New Truck

If you are buying or planning to buy a new truck, no matter what size or what make, specify a Master Carbureter. Your manufacturer will furnish a Master if you ask for it, even though it costs him a little more than ordinary carbureters. The Master Carbureter is not designed for trucks of any particular size or make, but delivers 100% efficiency on any truck and is in use on thousands of trucks all over the country.

It is not only a question of degree, the Master is not just "another" carbureter—it is entirely **different** from any other carbureter. It is built on an **advanced, patented principle** of carburetion that absolutely ensures **more power** and **more mileage** on **less fuel.** An examination of its scientific principle will convince you of the superiority of Master mechanical control over the "automatic" principle of old style carbureters—**a practical demonstration on your own truck will prove it to you.** Let us send you a Master **Carbureter for 30 days' FREE** trial. Let us put an end to your carbureter troubles. Write us today.

ENTERPRISE FUEL COMPANY
BALTIMORE, MD.

Master Carbureter Corporation,
Detroit, Mich.

We do not hesitate to state that we have found the Master Carbureter the most economical and satisfactory carbureter we have ever used. In fact, we are so pleased with the results obtained that we have just requested the International Motor Co. to have our four trucks recently ordered come through with the Master Carbureter.

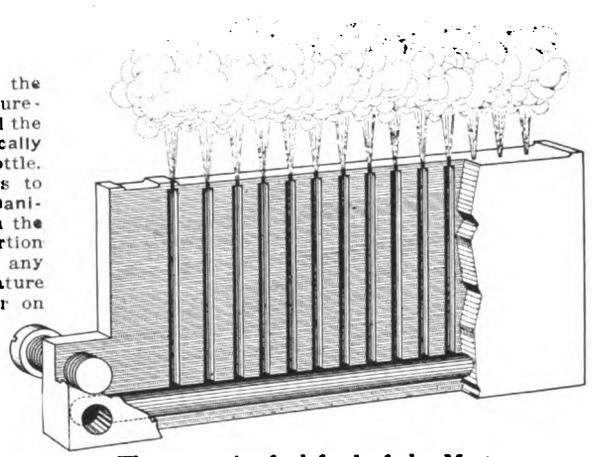
Very truly yours,
J. W. EDELEN, President.

The Carbureter Without Adjustments

Steering Post Control

The driver need never raise the hood to adjust the Master Carbureter. No needle valves to control the gas—the supply is **mechanically** graduated by the Rotary Throttle. No spring valves and shutters to adjust the air—the air is **mechanically** proportioned to the gas in the exact quantity, and this proportion is instantly accommodated to any change of weather or temperature by a mere touch of the finger on the steering post lever **from the driver's seat.**

The improved principle of the Master accommodates all conditions without adjustments.



The many-jet fuel feed of the Master

Secret of Fuel Economy

You can't get the maximum output from your motor, and the **greatest** economy of fuel unless your carbureter delivers a thoroughly vaporized mixture.

Instead of the ordinary 1 or 2 jet feed, the Master Carbureter has **14 to 21 separate jets** (according to size). As gas is needed, the jets are uncovered, **one by one,** as many as are required at the moment. Each jet delivers a **thin mist,** instead of a **solid stream.** The gasoline is completely broken up, pulverized to atoms, producing an **even,** velvet-like mixture. This mixture attains the highest degree of combustibility, converting **every bit of fuel into power.**

A NEW Standard of SIMPLICITY

Contrast the Master Carbureter with other carbureters with their auxiliary valves, compensating devices, butterfly throttles, springs, cams and dashpots. The Master is so **simple** and **strong** and **wear-proof** that it never gets out of order—only three moving parts. Twenty-three foremost truck manufacturers have adopted the Master Carbureter as standard equipment and thousands of truck owners have installed it to replace other carbureters. Once installed for trial, the Master never fails to stick on any truck, for invariably it gives **more power and mileage on the same fuel allowance.** Don't fail, when ordering your next truck, to **prove the Master at our risk.** Or let us send you one for installation on your old truck now.

Meet Us at the Show

Our address at the Grand Central Palace will be Booth D 39, Fourth Floor, or meet us at Chicago.

25 to 40% More Mileage, 30% More Power

And note that these results are not obtained from our own tests made under ideal conditions—they are obtained **all the time,** winter and summer, in every climate, by truck drivers under actual road conditions of all kinds.

In the interests of economy and efficiency, it will pay you to investigate the Master Carbureter. Write now for our catalog. Send the coupon at the left. Post yourself on this carbureter that is **DIFFERENT.**

Above all, don't try to judge it without seeing it and comparing its improved principle of design and operation. Let us send you copies of scores of letters like the one above.

Master Carbureter Corporation
1312-A West Fort St.
Detroit, Mich.

You may send me your catalog with free booklet — "Carburetion and Carbureters."

Name .....

Address .....

.....

MASTER CARBURETER CORPORATION

1312-A West Fort St., Detroit, Mich.

Pacific Coast Branch: 922 S. Los Angeles St., Los Angeles, Cal.

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Annual Review Issue

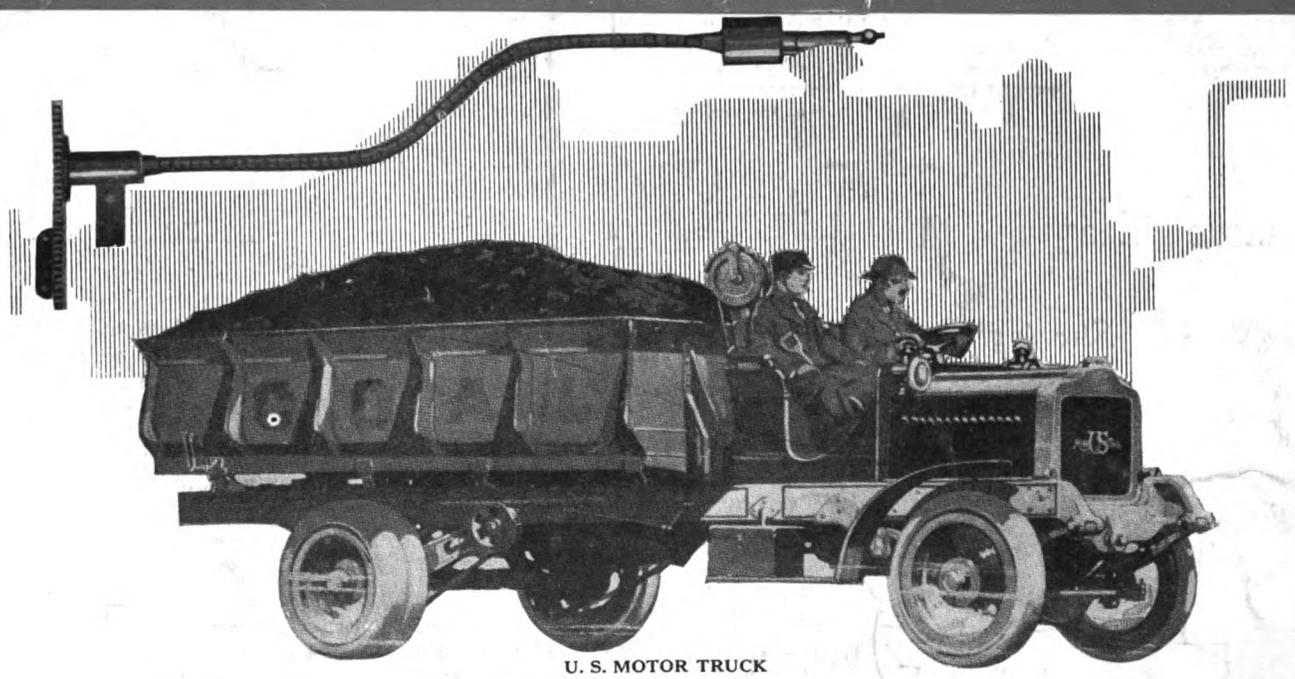
8 1917

The Commercial Vehicle

Volume XV
Number 11

JANUARY 1, 1917

Twenty Cents a Copy
Two Dollars a Year



U. S. MOTOR TRUCK

PROTECTED

More than ever the big truck manufacturers are equipping their cars with

PIERCE

GOVERNORS

Truck buyers—the owners of large fleets—usually try out several makes before standardizing. The truck that delivers the highest performance with the lowest upkeep cost is the one they select.

Now, you may buy the best truck on the market. It may be 100% efficient, and all that, but when it gets in the hands of a careless, speeding driver, what chance has it?

The good name of trucks equipped with PIERCE GOVERNORS is not at the mercy of reckless drivers, and the purchaser is given some tangible assurance that he will receive the efficient service which the manufacturer has promised him.

PIERCE GOVERNOR COMPANY

World's Largest Governor Builders

ANDERSON, INDIANA, U. S. A.

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The "Fast Mail" Carbureter

Uncle Sam's right of way over all traffic expedites mail delivery only when postal trucks are equipped with a *dependable carbureter.* New York City's Post Office is served by Republic Trucks, Master equipped. Read:

EMPIRE CARRYING CORPORATION
U. S. Mail Contractors

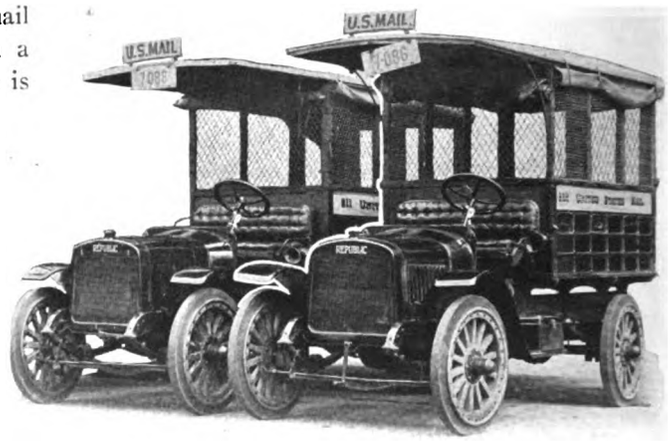
Master Carbureter Corporation,
Detroit, Mich.

Gentlemen:

Enclosed please find our order for ten of the 1¼" Junior MASTER CARBURETERS, with full hot-air attachments complete. We desire to have these installed on ten new Republic cars just purchased.

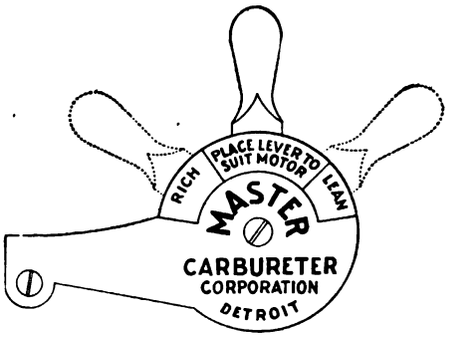
We are anxious to get these on right away as it means a considerable saving in gasoline to us. We ran one of these carbureters for several months on one of the Republic cars and found that our gasoline saving was in the neighborhood of 30 per cent. After installing the MASTER, we found that our consumption of gasoline dropped from about 11½ gallons to 7 and 7½ gallons, on a 77 mile schedule.

EMPIRE CARRYING CORPORATION,
Geo. A. Logan, Manager.



More Mileage MASTER CARBURETER More Power

Steering Post Control Lever



All weathers—all temperatures are instantly accommodated from the driver's seat by a touch on this lever. All Adjustments under the hood are eliminated.

YOU TAKE NO RISK—more mileage and more power are guaranteed to you. One of our 200 dealers is right near you, determined to see to it that the Master gives you the same perfect satisfaction that it is giving to thousands of owners of power trucks of every make and size. Install a Master on your old truck, specify it for your new one and hold us responsible for results. Your money back if it fails to give you 25 to 40% more mileage with greater power and with none of the troublesome adjustments required by automatic carbureters.

See It at the Shows
Grand Central Palace: 4th Floor
Coliseum Annex: 2nd Floor

FREE Mail This Coupon

for booklet, "Carburetion and Carbureters" and Master Catalog

Truck Manufacturers and Truck Owners in all parts of the country have put the Master to the severest tests, under the hardest road conditions, in all kinds of weather. The results are amazing! Let us tell you about them. We simply want you to *know* about the MASTER. Then you will always specify it for your trucks. Write us today, or mail coupon.

Mail This Coupon

Master Carbureter Corporation, 1301 West Fort Street, Detroit, Mich.
You may send me your catalog with free booklet, "Carburetion and Carbureters."

Name .....
Address .....
.....

The Carbureter that is DIFFERENT

Compare the Master with other carbureters. Note the absence of all springs, cams, dashpots, auxiliary valves and compensating devices. The Master is the scientific solution of carburetion. An investigation of its principle will convince you—a demonstration on your truck will prove it to you.

In the interest of more efficient and economical truck service, it will pay you to learn about the wonderful advantages of the MASTER:

Perfect Mixture—14 Jets instead of 1 to 3
No Adjustments
Simplicity of Construction
Steering Post Lever
Positive Mechanical Control Instead of Variable Automatic Operation
Quick Starting
Flexibility
Trouble-proof Operation
Vaporization of Low Grade Fuels
25 to 40% MORE MILEAGE
30% MORE POWER

MASTER CARBURETER CORPORATION

1301 West Fort St., Detroit, Mich.

Pacific Coast Branch: 922 S. Los Angeles St., Los Angeles, Cal.

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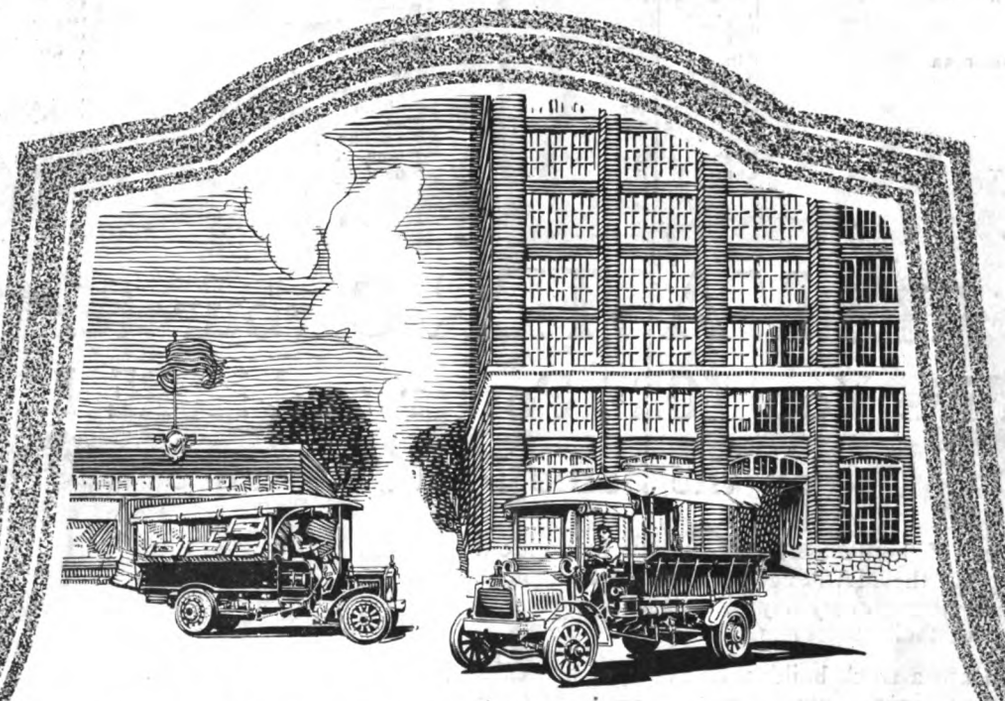
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JAN 18 1917

The Commercial Vehicle

Volume XV
Number 12

JANUARY 15, 1917

Twenty Cents a Copy
Two Dollars a Year



The "little fellow"—as well as the big business man—finds Packard silent, chainless trucks the cheapest to own and operate. Built in seven sizes, with fifty body types to choose from, the Packard line *alone* provides the one right truck for every hauling task. Shock-proof design makes them ten-year investments. Worm-drive cuts up-keep and operating costs. Fitness! Economy! Ask the man who owns one.

Packard Trucks

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If *Your* Truck is in this List—

A & B
Acason
Acme
Armleder
Atlas
Atterbury
Autocar
Available
Avery
Beech Creek
Bessemer
Blair
Brinton
Briscoe
Brockway
Burford
Chase
Clyde
Couple Gear
Collier
Columbia
Commerce
Continental
Corbitt
Corliss
Croce
Crowther-Duryea
Dart
Dayton
D-E
DeKalb
Denby
Denmo
Diamond-T
Dispatch
Doane
Dorris
Duplex
Ellsworth
Federal
Forschler
F. W. D.
Garford
G. A. Schacht
Geneva
G. V.-Mercedes
Gersix
Globe
G. M. C.
Gramm-Bernstein
Hahn
Hall
Harrison
Harvey
Hawkeye
Horner
Huriburt
Independent
I. H. C.
Jeffery
Kelly-Springfield
King
KisselKar
Kleiber
Knickerbocker
Knox Tractor
Koehler
Krebs
Lambert
Lane
Lange
Larrabee
Lawson
Lincoln
Lippard-Stewart
Little Giant
Maccar
Mack
Maxwell
Menominee
Mercury Bulley Trac.
Moreland
Moon
Nelson & LeMoon
Netco
New York
Niles
Old Hickory
Old Reliable
Overland
Packard
Packet
Palmer
Palmer-Moore
Peerless
Pennsy
Pierce-Arrow
Pullman
Rainier
Reo
Republic
Riker
Royal
Rush
Sanford
Saurer
Schleicher
Selden
Service
Signal
Standard
Steele
Stegeman
Sterling
Stewart
Studebaker
Sullivan
Superior
Thomas
Tiffin
Transport Tractor
Union
United
U. S.
Universal
Velie
Vim
Walter
Watson
White
Wichita
Wilcox
Wilson
Witt-Will
Wisconsin
W. S.
Zeitler & Lamson

The MASTER Carbureter

Will Give You MORE Power and MORE Mileage

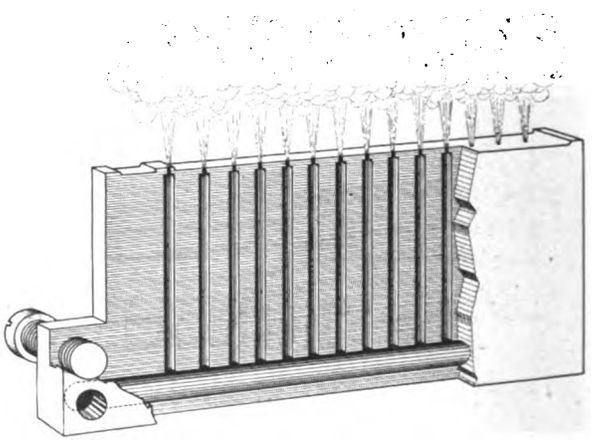
on the Same Fuel Allowance

Already several of these manufacturers have found it out and are adopting the MASTER as standard equipment. Others are learning it every day after installing Masters upon demand of their customers and dealers.

Whether you are a truck builder, truck buyer or dealer it will pay you to investigate for yourself—and at once. While you delay you are losing money.

When we tell you that the Master Carbureter with its new improved principle actually delivers more mileage and more power than carbureters of ordinary "automatic" type, we mean just that. IT IS DOING IT.

There's a reason why the Master will increase the efficiency of YOUR truck—a sound and scientific yet perfectly simple reason that you will grasp instantly. Let us explain it to you. Write us for information.



HERE'S THE REASON!

The Master's Multiple Jet Fuel Distributer

DEALERS! Get our proposition. It will interest you. Write us for full particulars.

Or, if you prefer to compete with the fastest selling carbureter on the market today, let us help you compete more successfully. Let us aid you to find the flaw in our proposition—if there is one. We will gladly tell you anything you have not already learned about this perfected carbureter.

Send your name for our new catalog.

Master Carbureter Corporation

1301 A West Fort St., Detroit, Mich.

You may send me your new catalog with free booklet, "Carburetion and Carbureters."

Name.....

Street Address.....

City.....

LET US PROVE IT
Send This Coupon!

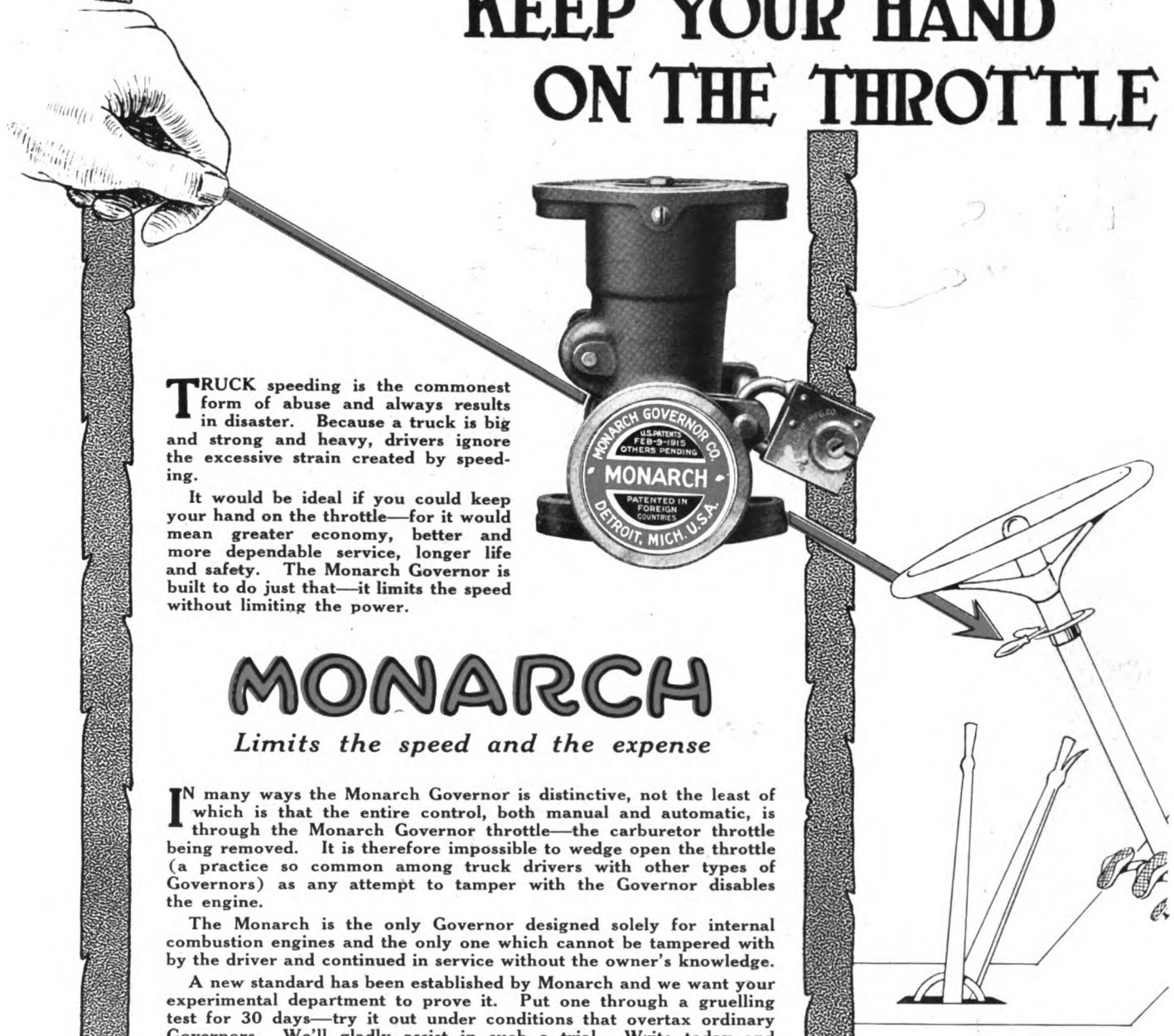
Do it now. Let us send you the new MASTER catalog with the whole story of this wonderful improved carbureter—what it has done and is doing for thousands of owners of trucks of every make. Read their testimony. Then give us permission to send you a MASTER on trial for test on your truck under any conditions you may choose. *Send the Coupon—or a postal NOW.*

MASTER CARBURETER CORPORATION

Pacific Coast Branch
922 S.Los Angeles St., Los Angeles,Cal. **1301-A West Fort St., Detroit, Mich.**

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KEEP YOUR HAND ON THE THROTTLE



TRUCK speeding is the commonest form of abuse and always results in disaster. Because a truck is big and strong and heavy, drivers ignore the excessive strain created by speeding.

It would be ideal if you could keep your hand on the throttle—for it would mean greater economy, better and more dependable service, longer life and safety. The Monarch Governor is built to do just that—it limits the speed without limiting the power.

MONARCH

Limits the speed and the expense

IN many ways the Monarch Governor is distinctive, not the least of which is that the entire control, both manual and automatic, is through the Monarch Governor throttle—the carburetor throttle being removed. It is therefore impossible to wedge open the throttle (a practice so common among truck drivers with other types of Governors) as any attempt to tamper with the Governor disables the engine.

The Monarch is the only Governor designed solely for internal combustion engines and the only one which cannot be tampered with by the driver and continued in service without the owner's knowledge.

A new standard has been established by Monarch and we want your experimental department to prove it. Put one through a gruelling test for 30 days—try it out under conditions that overtax ordinary Governors. We'll gladly assist in such a trial. Write today and arrange for test on your truck. Our catalog describes the Monarch—its construction and operation.

MONARCH GOVERNOR COMPANY

Detroit, Michigan



Sandow Truck with Monarch Governor—an efficient combination.

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POLACK TYRES



The eminent satisfaction given by Polack Tyres in former years caused the CHAPIN-SACKS MFG. CO., famed ice cream manufacturers, to again adopt Polack equipment in 1917

EXCLUSIVELY

10,000 MILES GUARANTEE—INVARIABLY EXCEEDED

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